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Wastewater Treatment Facilities
Las Cruces, New Mexico
(Draft Environmental Impact Statement)

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Dallas, TX

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The city of Las Cruces operates sewage treatment facilities which serve the city, the town of Mesilla, New Mexico State University, and parts of Dona Ana County. Major problems include: (a) inadequate collection and treatment capacity to accommodate the substantial growth projected to occur within the planning area; and (b) an existing treatment facility that is inefficient and cannot meet State and Federal standards regarding effluent quality. Alternatives regarding service area, collection system improvements, wastewater treatment, and sludge management were analyzed to accommodate expected sewage flows to the year 2005. As its preferred alternative, Las Cruces proposes to expand its service area slightly to conform to projected growth patterns, and to construct interceptor and collection sewers necessary to provide service throughout the urban area. This will principally impact non-agricultural lands northeast of the existing service area. The city proposes to use the existing plant site, and to replace the current treatment facility with a roughing filter followed by activated sludge treatment. The capacity of the new plant would be 8.9 mgd, an increase of about 100 percent over existing conditions. Sludge would be disposed of by injection on mesa lands west of the city.

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DALLAS, TEXAS 75270

TO ALL INTERESTED GOVERNMENT AGENCIES, PUBLIC OFFICIALS, PUBLIC GROUPS, AND INDIVIDUALS:

To comply with the provisions of the National Environmental Policy Act (NEPA) of 1969, the Environmental Protection Agency (EPA) has prepared this Draft Environmental Impact Statement (EIS) on the awarding of design and construction funds under Section 201 of the Clean Water Act to upgrade and expand the existing wastewater treatment facilities in Las Cruces, New Mexico.

EPA will hold a Public Hearing on the Draft EIS and the facilities plan at 7:30 p.m. on March 29, 1982, at the Las Cruces City Hall, in the City Commission Chambers.

Written comments on the Draft EIS should be submitted to Mr. Clinton B. Spotts, Regional EIS Coordinator, EPA, Region 6, 1201 Elm Street, Dallas, Texas 75270, by April 12, 1982. Comments on the draft will be incorporated into the Final EIS. The Final EIS will only be sent to agencies and interested parties who request a copy or make comments on the Draft.

If you need additional information, please contact Mr. Clinton B. Spotts at (214) 767-2716.

Sincerely yours,

Dick Whittington

Dick Whittington, P.E.
Regional Administrator

DRAFT ENVIRONMENTAL IMPACT STATEMENT

WASTEWATER TREATMENT FACILITIES
LAS CRUCES, NEW MEXICO

RESPONSIBLE AGENCY: U.S. Environmental Protection Agency, Region 6

ACTION BEING CONSIDERED: Possible awarding of construction funds for wastewater treatment facilities for the city of Las Cruces, New Mexico.

COOPERATING AGENCIES: New Mexico Environmental Improvement Division
New Mexico Department of Agriculture

CONTACT FOR FURTHER INFORMATION:
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ABSTRACT:

The city of Las Cruces operates sewage treatment facilities which serve the city, the town of Mesilla, New Mexico State University, and parts of Dona Ana County. Major problems include: (a) inadequate collection and treatment capacity to accommodate the substantial growth projected to occur within the planning area; and (b) an existing treatment facility that is inefficient and cannot meet State and Federal standards regarding effluent quality. Alternatives regarding service area, collection system improvements, wastewater treatment, and sludge management were analyzed to accommodate expected sewage flows to the year 2005. As its preferred alternative, Las Cruces proposes to expand its service area slightly to conform to projected growth patterns, and to construct interceptor and collection sewers necessary to provide service throughout the urban area. This will principally impact non-agricultural lands northeast of the existing service area. The city proposes to use the existing plant site, and to replace the current treatment facility with a roughing filter followed by activated sludge treatment. The capacity of the new plant would be 8.9 mgd, an increase of about 100 percent over existing conditions. Sludge would be disposed of by injection on mesa lands west of the city.

Responsible Official:

Dick Whittington

Dick Whittington, P.E.
Regional Administrator

CHAPTER 1
SUMMARY

1. SUMMARY

1.1 EXISTING PROBLEMS

The City of Las Cruces owns and operates wastewater collection and treatment facilities serving the City, the Town of Mesilla, New Mexico State University, and parts of Dona Ana County. Existing treatment is insufficient to meet existing State and Federal standards and the capacity of collection and treatment facilities is insufficient to accomodate projected growth. Alternatives to solve these problems must consider, in addition to economic and engineering factors, regional water quality objectives, water rights constraints, and the need to minimize impacts to prime agricultural lands. Because there is no comprehensive land use plan, decisions regarding the placing of major interceptors and treatment facilities will have a major influence on development patterns in Las Cruces over the next 25 years.

1.2 PROJECT ALTERNATIVES CONSIDERED BY APPLICANT

No Action. The alternative of taking no action has been rejected by the City because failure to address the problems cited in section 1.1 would cause continued violation of federal effluent regulations and, possibly, a court-mandated sewer hookup ban limiting development within the City. If this occurs, there probably would be widespread, uncontrolled growth on the prime agricultural lands of the Mesilla Valley outside the City limits. At a minimum, some steps must be taken to resolve the existing inadequacies in the treatment system, and to deal responsibly with the anticipated growth of the community.

Service Area. The single most complex issue faced during the planning process was the determination of the most appropriate service area for the municipal wastewater collection system. The debate focussed on the extent to which the existing service area (Figure 1-1) should be enlarged, with special concern about expansion into the agricultural lands of the Mesilla Valley north and south of the existing system limits. The proposed service area, illustrated in Figure 1-1, would extend sewers to all areas where extensive urban development is expected, and conforms to the growth pattern which is supported by other public investments. Extension of the service area farther into the Mesilla Valley was rejected because the valley is prime farmland which may not urbanize rapidly if sewer service is not provided. Also, the valley has no major sanitation problem associated with the use of on-site wastewater systems, and so there is no environmental problem requiring sewer extensions.

The proposed service area will encourage a compact and relatively efficient development pattern. Major growth would occur immediately adjacent to the existing urban area, primarily east of Interstate 25 and north, slightly beyond the existing city limits. There would also be significant infilling within the already developed urban area, and scattered developments

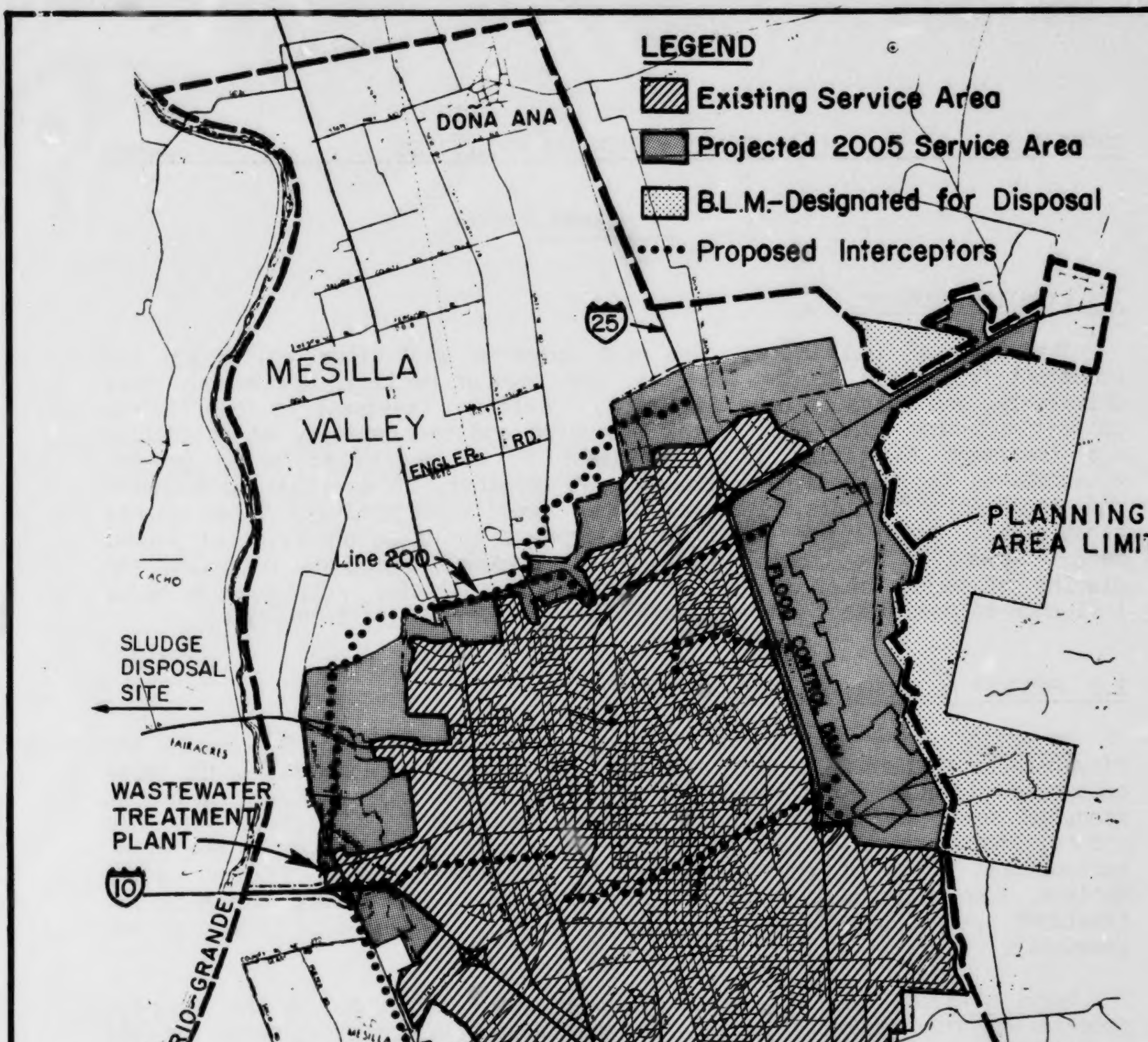
LEGEND
▨ Existing Service Area
▨ Projected 2005 Service Area
▨ B.L.M.-Designated for Disposal
•••• Proposed Interceptors
DONA ANA
25
MESILLA
VALLEY
ENGLER RD.
PLANNING
AREA LIMITS
Line 200
CACHO
SLUDGE
DISPOSAL
SITE
FAIRACRES
FLOOD CONTROL DAM
WASTEWATER
TREATMENT
PLANT
10
RIO GRANDE
MESILLA
BARKER LIFT
STATION
TORTUGAS
MESILLA
VALLEY
PLANNING
AREA LIMITS
N
0
1/2
1
2
GRAPHIC SCALE (miles)

FIGURE I-1. PROPOSED INTERCEPTORS AND SERVICE AREAS

in the Mesilla Valley north and south of Las Cruces. The service area can be modified if growth patterns change from those now predicted. In particular, service could be extended eastward if Bureau of Land Management (BLM) lands are released for urban development (see Figure 1-1). Similarly, service can be extended northward to or beyond Engler Road, if this area grows substantially as predicted by County officials (see Figure 1-1).

This development pattern is expected to reduce the rate at which valley farmland is urbanized. Sewer service would be provided to approximately 900 acres of farmland. Although urbanization of this acreage is a significant adverse environmental impact, it is unavoidable since the same amount of acreage must be taken out of production simply to transfer water rights to the City of Las Cruces. An additional 1,100 acres of farms are likely to be developed outside the service area, in low-density, rural subdivisions. The total loss of farmland, 2000 acres, is far less than the 7,000 acres which would be developed if historic growth patterns were continued.

The proposed service area has significant environmental benefits, because it will relieve development pressures on agricultural lands. The benefits include: support for agricultural production of food and fiber, preservation of greenbelt/wildlife areas, comparatively minimal intrusion of urban activity (traffic, dust, noise) into rural areas, and reduced fragmentation of irrigated panels. During the public participation process, these benefits received strong community support.

Collection System. The collection system alternatives derive from the need to construct interceptors in areas of existing and projected growth, and from the need to correct existing problems, especially overloaded lift stations. Engineering and economic criteria were the basis for selecting the preferred alternatives, except that specific routes for major interceptors were chosen to minimize the environmental impact of construction.

The Applicant proposes to upgrade all lift stations and to construct major interceptors as shown in Figure 1-1. This proposal conforms to the service area as described above. The major proposal is to construct a large interceptor near the western and northern limit of the service area, to relieve existing over-loading and to accomodate projected growth in the northeast portion of the service area. Additional lines would provide service in the central part of Las Cruces and to the east behind the flood control dam. A new force main would be constructed from the Barker Lift Station to the treatment plant. Interceptor routes follow arroyos or are located in presently undeveloped areas. This should provide benefits by minimizing utility relocations, traffic disruptions, noise and dust. However, lines located in arroyos have the potential to adversely effect erosion and sedimentation; these adverse impacts require mitigation during project design and construction.

Wastewater Treatment and Disposal. By the year 2005, the service area in Figure 1-1 would collect wastewater from an estimated 90,000 residents (leaving 13,800 persons to use on-site systems). This will require treatment facilities having a capacity of 8.9 million gallons per day (mgd), compared to the existing flow of 4.6 mgd, and the existing treatment capacity of 2.9 mgd. The Applicant considered 15 different treatment alternatives. Eight were rejected during an initial screening: rehabilitation of the existing plant; land application options; aquaculture; extended aeration; and oxidation lagoons; and others. Alternative plant sites (and operation of multiple plants) also were rejected after initial evaluation, because of added costs without commensurate benefits.

Seven alternatives were subjected to detailed analysis and are listed in Table 1-1; the table includes the total dollar cost of each treatment process and a comparative ranking of the alternatives with respect to a number of economic, engineering and environmental issues. On the basis of the rankings, the Applicant considers that two of the alternatives are most cost-effective. Alternative 3, conventional activated sludge treatment, has the lowest dollar cost and is considered to be the best choice from an engineering point of view. Alternative 6, trickling filter treatment followed by activated sludge polishing, has virtually the same cost as alternative 3, but has two major advantages: first, a part of the option could be phased in quickly to solve the existing problems at the treatment plant; and second, if NPDES regulations were relaxed (see discussion p. 5-25), the full plant need never be built, and the costs of treatment would be substantially reduced. Because of these benefits, which have received strong public support, alternative 6 is preferred by the Applicant.

Wastewater Reuse. Wastewater now discharged by the City of Las Cruces is fully utilized downstream, primarily for farming in New Mexico, Texas and Mexico. Any change in the discharge pattern would adversely affect the downstream users and could force the City to obtain new water rights. A more formal type of agricultural reuse (land application) was rejected because of: the large acreage requirement; the uncertain availability of land; cropping restrictions; high costs; and management obstacles.

Sludge Management. Many options exist for sludge thickening, stabilization, dewatering, further treatment, and disposal. The following specific processes were rejected after initial screening: thickening by dissolved air flotation or centrifuge; stabilization by lime, chlorine treatment, or aerobic digestion; dewatering by vacuum filter, pressure filter, centrifuge, or drying lagoons; advanced treatment by chemical, heat, or radiation methods; and disposal by incineration, cogeneration, raw sludge landfill, or sludge/sewage composting. Reuse alternatives, such as sludge sale, giveaway, and parks application, were rejected for a number of reasons, including the lack of a market for highly-treated sludge and the need to restrict public access to sites where less-treated sludge is utilized. However, the remaining alternatives involve some type of sludge stockpiling, and reuse can be considered in the future if appropriate.

Based on the screening, gravity thickening of primary and secondary sludge is appropriate as part of any sludge management scheme. Detailed evaluations were performed on four alternatives for stabilization, dewatering and disposal

TABLE 1-1. EVALUATION OF TREATMENT ALTERNATIVES.

	Alt. 1 2.9/6.0 Combination	Alt. 2 Oxidation Tower	Alt. 3 Activated Sludge	Alt. 4 Rotating Bio. Contactors	Alt. 5 Activated Bio-Filter	Alt. 6 Rough Filter Act. Sludge	Alt. 7 Aerated Lagoons
Present Worth of All Costs	$18,732,000	$24,239,000	$17,708,000	$21,543,000	$18,299,000	$17,867,000	$20,288,000
Evaluation Parameters:							
Dollar Costs	1	3	1	2	1	1	2
Energy Use	3	3	1	1	2	1	3
Operational Ease and Reliability	3	2	2	2	2	2	1
Process Control Flexibility	3	3	1	3	2	2	3
Adaptability to Future Conditions	3	3	2	3	2	1	3
Environmental Considerations	3	1	1	1	1	1	3
Interim Solution	3	3	2	2	3	1	3
Public Acceptance	2	3	1	2	2	1	3
TOTAL OF RANKINGS	21	21	11	18	16	10	21

1 is 'best'; 3 is 'least desirable'.

Source: Molzen-Corbin, 1981a; Lee Wilson and Associates, 1981a.

TABLE 1-2. EVALUATION OF SLUDGE MANAGEMENT ALTERNATIVES.

	Alt. 1 Anaerobic Digestion/ Wet Injection	Alt. 2 Ana. Digest./ Drying Beds/ Landfill	Alt. 3 Thermal Cond./ Drying Beds/ Landfill	Alt. 4 Filter Press/ Composting/ Landfill
Present Worth of All Costs	$9,766,000	$10,987,000	$11,964,000	$13,711,000
Evaluation Parameters:				
Dollar Costs	1	2	2	3
Energy Use	1	1	2	3
Resource Recovery	1	1	1	1
Operational Ease and Reliability	1	1	2	3
Process Control Flexibility	3	3	1	2
Environmental Considerations	1	1	1	1
Interim Solution	1	2	3	3
Public Acceptance	1	2	3	3
TOTAL OF RANKINGS	10	13	15	19

1 is 'best'; 3 is 'least desirable'.

Source: Molzen-Corbin, 1981a; Lee Wilson and Associates, 1981a.

of the sludge. Table 1-2 includes the total dollar cost of each treatment process, and a comparative ranking of the alternatives with respect to a number of economic, engineering and environmental issues. Because of its low cost and otherwise acceptable characteristics, the Applicant's preferred choice is alternative 1. This approach would involve: anaerobic digestion of raw sludge (which produces methane gas which can be used to help meet the energy requirements of the new plant); truck transport of the wet sludge to a site near the municipal airport; injection of the sludge into the soil; and protection of the site against public access and growth of food chain crops. A variation on this alternative, using a site near the treatment plant, is less expensive but was rejected because of the potential for ground-water contamination.

Other Alternatives. Specific alternatives were considered and (as appropriate) selected for: on-site wastewater systems management; effluent disinfection processes; energy conservation; odor reduction; water conservation and flow reduction; other wastewater sources; administrative alternatives; and project funding.

Of these, funding received most of the public input, because the local costs of the proposed project range from $449,000 to over $3,573,000 per year depending on the amount of the federal and state funds (if any) which are granted to support the facility design and construction. The preferred method of cost-recovery would design sewer rates so that those who benefit from new facilities would pay for them. Residential sewer fees could reach $30 per month at one hundred percent local financing. Increased hookup charges, stand-by charges, and other cost-recovery mechanisms are being considered to offset this rate increase.

Impacts of Preferred Alternative. Table 1-3 summarizes the environmental impact of the Applicant's preferred alternative.

1.3 EPA ALTERNATIVES

The United States Environmental Protection Agency (EPA) may choose to fund all, part, or none of the Applicant's preferred alternative or some other alternative. Any decision to limit or deny funding would not remove the Applicant's responsibility to improve its treatment works.

1.4 OTHER AGENCY ALTERNATIVES

The New Mexico Environmental Improvement Division (EID) has funding alternatives similar to those available to EPA.

TABLE 1-3. SUMMARY OF IMPACTS OF THE APPLICANT'S PREFERRED ALTERNATIVE.

Adverse impacts are generally those which cannot be avoided except by the No Action Alternative: most of the adverse impacts can be mitigated.

In addition to impacts identified below, substantial short-term benefits are associated with construction jobs, expenditures.

ENVIRONMENTAL RESOURCE	SHORT-TERM ADVERSE IMPACTS	LONG-TERM ADVERSE IMPACTS	LONG-TERM BENEFITS
EARTH RESOURCES	Accelerated water erosion resulting from construction of facilities, especially where sewer lines lie in or cross an arroyo	Sludge injection site could experience increased wind erosion, metals build-up in soils	Improved soil properties at sludge injection site (possibly enabling ultimate recycling of soil)
WATER RESOURCES	Dewatering during construction could cause water-table lowering, odors, water-quality changes	Interceptor 230 is located in a flood hazard zone	Increased flows in Rio Grande due to greater wastewater discharge; all effluent will be recycled downstream Improved quality of the Rio Grande, due to enhanced quality of effluent
AIR & SOUND QUALITY	Equipment exhausts, dust and noise during construction	Small increase in emissions, noise at treatment plant	Reduced odors at lift stations, treatment plant
BIOLOGY	Temporary loss of vegetation and habitat at some construction sites, especially arroyos	Clearing of 40 acres at sludge injection site	Improved aquatic habitat in Rio Grande; produtivity and habitat value of sludge injection site ultimately improved
ARCHAEOLOGY & HISTORICAL RESOURCES	Impaired quality of visitor experience in historic zones during construction	Possible loss of archaeological resources at all new facilities; possible foundation damage to historic buildings	Improved quality of visitor experience due to reduction of odors from lift stations adjacent to La Mesilla Historical District
SOCIO-ECONOMICS AND LAND USE	Traffic and utility disruption along construction corridors; reduced access to businesses	104 acres of grazing land converted to use as solid waste disposal site Substantial increases in sewer rates	Collection system supports compact urban form which will minimize impacts on agricultural land while supporting public investments; compact urban form has many secondary benefits, such as reduced travel (hence less air pollution, energy use); less disruption of rural environment
ENERGY & OTHER RESOURCES	Utilization of energy and resources during construction	Wastewater treatment requires major commitments of funds, labor, energy, materials	Net reduction in per capita resource use for wastewater treatment; methane recycling recovers energy value of sludge

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CHAPTER 3
INTRODUCTION

3. INTRODUCTION

3.1 BACKGROUND ON APPLICANT AND APPLICATION

Las Cruces, the seat of Dona Ana County, is located in southern New Mexico along the Rio Grande (Figure 3-1). The city is noted for its sunny climate, its agricultural setting, and its blending of cultures. Major contributors to the economy are the area's highly productive cropland, the New Mexico State University, and nearby government installations such as White Sands Missile Range.

The City of Las Cruces maintains and operates wastewater collection and treatment facilities which serve the City, New Mexico State University, the Town of Mesilla, and a few locations within Dona Ana County. Through the authority of a joint powers agreement with these entities, the City has applied for and received a grant to prepare a facilities plan for improvements to its wastewater collection and treatment system. The Plan is intended to provide a framework for decision-making through the year 2005.

Funding of 75 percent of planning costs are provided by Environmental Protection Agency (EPA) grant number C-35-1082-01; the New Mexico Environmental Improvement Division (EID) and the grantee pay the remainder in equal shares. Molzen-Corbin and Associates, Inc., of Albuquerque, was selected to prepare the Las Cruces Facilities Plan. Existing facilities, and problems which need to be addressed, are summarized in Chapter 4.

The planning area, as shown on Figure 3-1, includes development currently served by wastewater collection facilities, as well as areas that are likely to experience significant growth during the planning period. The current planning area population is 59,900 persons, which is projected to increase to 103,800 by the year 2005 (see section 6.6.2).

3.2 EPA LEGISLATIVE AUTHORITY AND RESPONSIBILITIES

Decisions made by Las Cruces about water and wastewater management are partly dependent upon the laws, regulations, and grant programs of the Federal government, especially on the Congressional mandates known as the Clean Water Act and the National Environmental Policy Act.

Clean Water Act. In 1972 Congress enacted Public Law 92-500, Amendments to the Federal Water Pollution Control Act, in order to establish a comprehensive program which would "restore and maintain the chemical, physical and biological integrity of the Nation's waters". Because municipal sewage is one of the major point sources of water pollution in the U.S., Title II of the new law provided for an expanded program of federal assistance in the construction of sewage treatment facilities, and gave the Environmental Protection Agency (EPA) authority to fund such activities, provided that state and local govern-

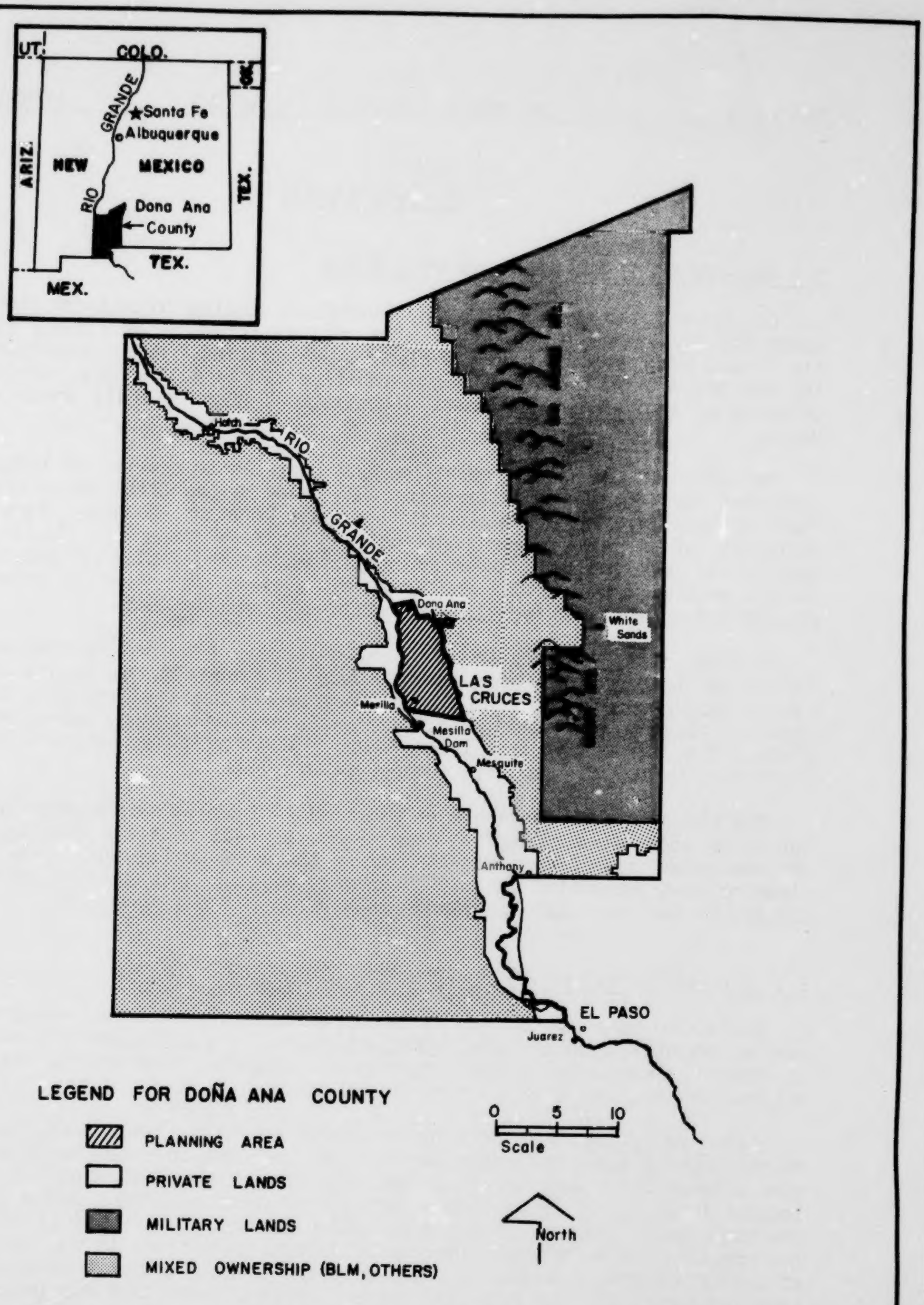
UT.
COLO.
OKLA.
Santa Fe
Albuquerque
ARIZ.
NEW MEXICO
TEX.
RIO GRANDE
Dona Ana County
TEX.
MEX.
Hatch
RIO GRANDE
Dona Ana
White Sands
LAS CRUCES
Mesilla
Mesilla Dam
Mesquite
Anthony
EL PASO
Juarez
LEGEND FOR DOÑA ANA COUNTY
▨ PLANNING AREA
☐ PRIVATE LANDS
▩ MILITARY LANDS
░ MIXED OWNERSHIP (BLM, OTHERS)
0 5 10
Scale
North

FIGURE 3-1. DOÑA ANA COUNTY, N.M.

ments supply 25 percent of the necessary financial support. The EPA grants are normally given in three steps or phases: I. initial planning; II. detailed design; and III. actual construction. Under the law the initial planning phase is emphasized, and must provide a long-range look at a wide range of alternatives for the collection, treatment and ultimate disposal of waterborne wastes. Actions which promote the reclamation and reuse of wastewater are especially encouraged by the Act, as is clean-up of wastes to the point that no discharge of pollutants occurs from a treatment facility.

Public Law 92-500 requires that a permit be issued for any wastewater discharge to the waters of the U.S. The permit system is referred to as the National Pollutant Discharge Elimination System (NPDES). Compliance with the water-quality requirements of a wastewater plant's NPDES permit is a mandatory objective of the facilities planning process.

In 1977 Congress passed Public Law 95-217, which revised portions of the 1972 Act. Collectively, the complete amended act is referred to as the Clean Water Act (CWA). Emphasis was placed upon giving planning consideration to innovative technologies for water reuse, energy conservation and/or complete removal of pollutants. Selection of innovative alternatives is encouraged by the availability of 85 percent Federal participation in facility design and construction, instead of the conventional level of 75 percent funding.

National Environmental Policy Act (NEPA). NEPA is Public Law 91-190, and was signed in 1969. There are six specific environmental objectives of federally-funded actions, set forth in section 101(b) of NEPA as follows.

1. To fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.

2. To assure for all Americans safe, healthful, productive and aesthetically and culturally pleasing surroundings.

3. To attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable or unintended consequences.

4. To preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice.

5. To achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities.

6. To enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

NEPA also provides that an Environmental Impact Statement (EIS) be prepared by federal agencies which propose a major action that significantly affects the quality of the human environment. The EIS must provide information to be used in federal decision-making. Section 102(2)(c) of NEPA requires the EIS to consider:

a) the environmental impact of the proposed action;
b) any adverse environmental effects which cannot be avoided should the proposal be implemented;
c) alternatives to the proposed action;
d) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and
e) any irreversible and irretrievable commitments of resources which would be involved due to the implementation of the proposed action.

EPA's decision to prepare an EIS on the Las Cruces project is discussed in section 4.2. Based on the most recent regulations regarding EIS preparation (CEQ, 1978; EPA, 1979d), the document is to concentrate on key issues as determined through an early public "scoping" process, and as further defined during an extensive public participation process. The public participation program normally includes the formation of a Citizens Advisory Committee of local citizens to review and provide advice in the Facilities Plan and EIS processes. The EIS must provide a concise analytical statement, usually of less than 150 pages concentrating on evaluation of real alternatives.

The EIS process includes cooperation with all federal and state agencies which have management responsibilities for key environmental resources. Table 3-1 lists agencies normally concerned with wastewater projects in New Mexico. Chapter 7 documents the public participation program during EIS preparation and describes the process of coordination and review which will apply to the Draft EIS. A chapter of the Final EIS will include all public comments on the Draft, and EPA's responses to these comments.

3.3 INVOLVEMENT OF OTHER AGENCIES

In addition to the general coordination associated with any wastewater EIS (Table 3-1), EIS preparation mandates consideration of project-related decisions which may be made by governments or agencies other than EPA. In the specific case of Las Cruces, decisions made regarding wastewater management may interact with decisions of New Mexico Environmental Improvement Division (EID). The State of New Mexico, through the Water Quality Control Commission and EID, establishes wastewater planning priorities in New Mexico (Las Cruces is number 11 on the 1981-82 draft priority list) and contributes 12.5 percent of the funding to Section 201 wastewater projects. EID also is the lead agency for enforcement of water-quality regulations. Additional duties of the agency include development of wasteload allocations for future NPDES permits and administration of on-site wastewater system regulations and the State ground-water discharge regulations.

TABLE 3-1. INTERAGENCY COORDINATION RESPONSIBILITIES.

While all coordination needs to be documented in the EIS, items with an asterisk (*) represent major, mandatory elements of the consultation process.

EPA Coordination Responsibilities1/	Coordinating Agencies and Responsibility	Authority
HISTORICAL AND ARCHAEOLOGICAL SITES		
Identify properties listed on or eligible for listing on the National Register of Historic Places that may be affected by the undertaking.* Identify effects of undertaking on those properties.	State Historic Preservation Officer; Advisory Council on Historic Preservation; National Park Service: Identify existing and potential Register properties and comment on findings of environmental document.* Undertake data recovery and preservation activities if the undertaking may cause irreparable loss or destruction of significant scientific, prehistoric or archaeological data.	National Historic Preservation Act of 1966, as amended; Archeologic and Historic Preservation Act of 1974; Reservoir Salvage Act of 1960; and Executive Order 11593, entitled "Protection and Enhancement of the Cultural Environment."
WETLANDS PROTECTION AND FLOODPLAIN MANAGEMENT		
Determine if proposed actions will be in or affect wetlands. If so, prepare a wetlands assessment as part of the environmental document. Identify flood hazard areas as they are related to existing and proposed facilities.	U.S. Army Corps of Engineers: Make wetland determinations. Federal Emergency Management Agency: Provide flood hazard maps of the planning area.	Executive Order 11990, Protection of Wetlands; EPA's Statement of Procedures on Floodplain Management and Wetlands Protection (January 5, 1979). Executive Order 11988, Floodplain Management; Flood Insurance Act of 1968; Flood Control Act of 1970; National Flood Disaster Protection Act of 1973; refer also to Wetlands Protection.
Request preliminary determination of need for permits for construction in a waterway, as relates to dredge and fill activities.	U.S. Army Corps of Engineers: Comment on findings of environmental document as may relate to Corps projects; indicate likelihood of need for Section 404 or Section 10 permits.	Section 404 of Clean Water Act of 1972; Section 10 of the Rivers and Harbors Act of 1899.
AGRICULTURAL LANDS		
Request identification of significant agricultural lands in the planning area. Evaluate impacts of the proposed action and recommend mitigation measures.	State and/or Area Conservationist, U.S. Soil Conservation Service: Identify significant agricultural lands, such as reported in the Important Farmland Inventory.	EPA's Policy to Protect Environmentally Sensitive Agricultural Lands (September 8, 1978); memo from CEQ to Heads of Agencies on "Analysis of Impacts on Private or Unique Agricultural Lands in Implementing the National Environmental Policy Act", September 8, 1980.
WILD AND SCENIC RIVERS		
Request identification of designated or nominated Wild, Scenic or Recreational rivers under the Wild and Scenic Rivers Act. Identify and avoid or mitigate all impacts to such rivers.	National Park Service; State Scenic Rivers Administrator; Bureau of Land Management; U.S. Forest Service: Identify Wild and Scenic rivers. Comment of findings of environmental document.	Wild and Scenic Rivers Act of 1968; Water Resources Planning Act of 1965.
FISH AND WILDLIFE		
Identify and determine impacts to flora and fauna and to any natural stream or body of water and consult with reviewing agency on mitigating, preventing or compensating for project-related losses of wildlife and to enhance other resources.	U.S. Fish and Wildlife Service; State Department of Game and Fish: Comment on findings of the environmental document.	Fish and Wildlife Coordination Act of 1958.

TABLE 3-1. INTERAGENCY COORDINATION RESPONSIBILITIES. (continued).

EPA Coordination Responsibilities[1]	Coordinating Agencies and Responsibility	Authority
ENDANGERED SPECIES PROTECTION		
Request identification of all designated and proposed endangered or threatened species and critical habitats in the area. Prepare biological assessment of endangered species and/or critical habitats if necessary.	U.S. Fish and Wildlife Service; State Department of Game and Fish: Identify endangered species or habitats, including formal review by the Office of Endangered Species if required under Section 7 of the Endangered Species Act.	Endangered Species Act of 1973.
AIR QUALITY		
Assess direct and indirect impacts of the project on air quality. If there are possible significant adverse effects, consult with the state or local agency to ascertain conformity of the action to the State Air Quality Implementation Plan (SIP). Determine if any increased emissions are allowable or will be offset.	N.M. Environmental Improvement Division (NMEID), Air Quality Bureau: Assist with assessment of project impacts. Respond to request for conformity concurrence.*	Clean Air Act, as amended, 1977.
OTHER: PUBLIC LANDS, NOISE, WATER QUALITY, OTHER STATE AND LOCAL CONCERNS		
Consult with appropriate agencies and assess impacts. Submit draft environmental document to A-95 Clearinghouses for review.[2] Identify NPDES standards and violations, and relationship of project to the Clean Water Act. Assess conformance to the Section 208 Areawide Wastewater Management Plan. Access conformance to other State and local plans, such as recreation and open space, economic development and county and municipal plans.	U.S. Forest Service; U.S. Bureau of Land Management; State Planning Office; Council of Governments; NMEID; of Governments; NMEID: Comment on findings of environmental document*; opportunity for comment from local Council of Governments and State Planning Office required.	NEPA and Clean Water Act; Noise Control Act of 1972; Federal Insecticide, Fungicide and Rodenticide Act; as amended; Resource Conservation and Recovery Act; Toxic Substances Control Act; Safe Drinking Water Act; Office of Management and Budget Circular A-95.

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1. EPA refers to EPA or persons acting on behalf of EPA or the grantee.
2. Office of Management and Budget Circular A-95 requires that State and areawide "clearinghouses" coordinate Federally-funded projects.

Sources: a) EPA, 1979. Implementation of procedures on the National Environmental Policy Act. 44FR 64174-64193, Nov. 6, 1979, 40 CFR Part 6.
b) EPA Region 6, 1978. Instruction for preparing environmental information documents for construction grants projects. CG-99, revised 11/8/78.
c) Spotts, Clinton B., August 1979. Working guidelines for the preparation of environmental impact statements.
d) EPA, 1979. Environmental assessment of construction grants projects. EPA-430/9-79-007.

CHAPTER 4
PURPOSE AND NEED

4. PURPOSE AND NEED

4.1 PROBLEMS WHICH NEED TO BE ADDRESSED

Figure 4-1 indicates the areas served by the existing wastewater collection system and the location of the present treatment plant. The existing facilities consist of collection and interceptor lines, six lift stations, and a single treatment plant. The treatment plant has undergone many additions, deletions and remodelings. Most recently (1975) an attempt was made to convert the plant from the trickling filter process to the conventional activated sludge process, utilizing trickling filter structures for aeration basins. Aerobic sludge digestion was also added in 1975 (Molzen-Corbin, 1980a). Refer to the Glossary for definition of technical terms, and to Appendix A for details of existing wastewater facilities.

Existing Problems. The following problems were identified during detailed analysis of the present wastewater system (Molzen-Corbin, 1980a).

1. The design of the present plant was for 5 million gallons per day (mgd). However, according to the calculations of Molzen-Corbin and Associates (Molzen-Corbin, 1980a), the organic capacity of the plant stands at 2.9 mgd. The hydraulic capacity is 4 mgd under efficient flow conditions, although physically 5.5 mgd or more can pass through the facility. Based on this analysis, the plant is organically overloaded under present flow conditions. This results in inadequate treatment of wastewater and violation of the NPDES permit (refer to Appendix A for details concerning the permit requirements and effluent quality). Inability to meet the permit has been a problem for several years. An EPA Administrative Order issued in 1976, and a Show Cause Order issued in 1978, resulted in federal and state funds being spent to upgrade solids handling facilities. These facilities came on line in early-1981, but thus far the City has been unable to meet the permit. As a result, in June of 1981 another Administrative Order was issued requiring compliance with the terms of the permit. The City was unable to comply in the time alloted and, as of January 1982, was in the process of providing EPA with documentation relating to non-compliance, including a detailed solids (sludge management) inventory. The Las Cruces effluent also violates Part 2 of the New Mexico Water Quality Control Commission regulations; the State is considering separate enforcement actions.

2. The treatment plant is extremely difficult to operate and maintain and is not suitable for future expansion. Undersized unit operations, inadequate yard-piping, and general plant configuration create a difficult operating environment and will make any expansion or renovation costly.

3. Power consumption at the treatment plant is twice that expected from a plant of its size and type. EPA's Innovative and Alternative Technology Assessment Manual (EPA, 1980a) indicates that a 5 mgd activated sludge plant, with equivalent aerobic digestion capacity, uses about 2 million kilowatt

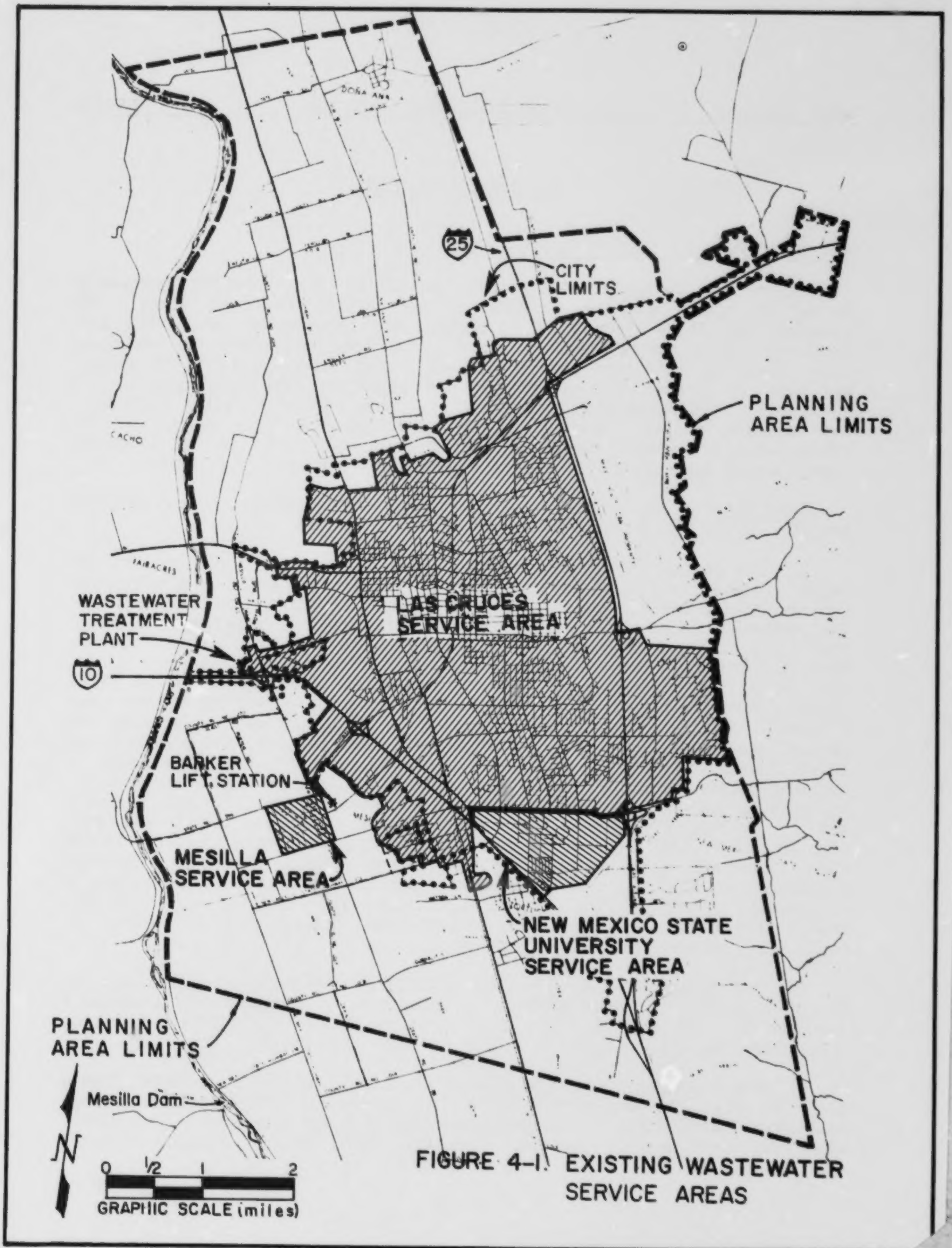

DOÑA ANA
25
CITY LIMITS
PLANNING AREA LIMITS
CACHO
FAIRACRES
WASTEWATER TREATMENT PLANT
LAS CRUCES SERVICE AREA
10
BARKER LIFT STATION
MESILLA SERVICE AREA
NEW MEXICO STATE UNIVERSITY SERVICE AREA
PLANNING AREA LIMITS
Mesilla Dam
N
0 1/2 1 2
GRAPHIC SCALE (miles)

FIGURE 4-1. EXISTING WASTEWATER SERVICE AREAS

hours per year (kwh/yr). Adding to this another 300,000 kwh/yr for operating the entrance lift station at Las Cruces makes a total expected usage of 2.3 million kwh/yr for a 5 mgd plant. However, the existing Las Cruces plant uses about 4.5 million kwh/yr (refer to Figure 6-15), approximately double what would be expected.

4. The collection system is generally in good condition. Four locations have been identified as causing odors due to inadequate grade and/or sand accumlation (see Section 5.2.2); recommendations for resolution of the problems have been presented in the Facilities Plan.

5. The interceptor system (arterial sewers) is generally adequate with respect to the total wastewater system configuration, with the exception of four lines which currently carry flows in excess of their design capacities. Gentle slopes and long lines result in sewage arriving at some lift stations and the treatment plant in a septic (odorous) condition.

6. The facilities plan identifies a major lift station in the system, the Barker lift station, as being overloaded (Figure 4-1).

Because of these problems, several lift stations and the treatment plant are sources of odors which affect nearby residential and commercial properties. Disease vectors such as flies also are a problem at the plant; the fly population has been reduced by the use of parasitic wasps.

Future Problems. As shown in Table 5-1, wastewater flows collected in the Las Cruces area are expected to double by the year 2005. This will require significant expansion of the already overloaded treatment facilities. Many interceptor sewers will become overloaded and will need relief. Areas of new development will require collection lines and interceptors. Clearly, a major focus of facilities planning is to accommodate the substantial growth which is predicted for the planning area.

4.2 PURPOSE OF EIS

The Environmental Protection Agency (EPA) determined that an Environmental Impact Statement (EIS) was necessary regarding any proposed or alternative wastewater facilities considered for Las Cruces. The EPA decision was announced in a Notice of Intent published in the Federal Register on July 3, 1980. The EIS has been prepared using the "piggy-backing" approach whereby the impact evaluation was completed by Lee Wilson and Associates, Inc., of Santa Fe, New Mexico, concurrently with preparation of the facilities plan.

This EIS is intended to provide essential information regarding the options available for treatment and reuse of wastewater, so that citizens and government officials can make an informed choice among the available alternatives. In evaluating alternatives the technique of cost-effectiveness analysis is used. The analysis involves comparing all alternatives in a logical, objective, and systematic manner in order to identify relative merits and deficiencies. Where practical the comparisons are quantitative, and in some cases they involve the use of monetary values. The goal of the analysis is to identify the most cost-effective alternative, which is the option that:

- achieves all requirements mandated by Federal, State and local laws and regulations, including environmental requirements; and

- does so with the minimum long-term cost to society, that is, with the greatest benefits and least attainable combination of dollar expenditures, environmental sacrifices and social burdens.

While quantitative and monetary terms are used in the analysis, cost-effectiveness is partly dependent upon qualitative considerations and subjective judgments. Consequently the results of the analysis are neither absolute nor fixed.

CHAPTER 5

DESCRIPTION AND EVALUATION OF ALTERNATIVES

5. DESCRIPTION AND EVALUATION OF ALTERNATIVES

This chapter describes and evaluates alternative plans for controlling water pollution from the City of Las Cruces. Alternatives considered by the City are presented in part A of the chapter. Alternatives available to the Environmental Protection Agency are discussed in part B (see page 5-43). In these discussions, the term Applicant is used to refer to the City of Las Cruces; the term Steering Committee refers to the representatives of the joint powers (Las Cruces, Dona Ana County, Mesilla, New Mexico State University), and the term CAC refers to the citizens committee formed as part of the public participation process.

PART A. ALTERNATIVES CONSIDERED BY THE APPLICANT

The Applicant, through the Steering Committee and CAC, evaluated a large number of alternatives for the collection and treatment of wastewater within the boundaries of the facilities planning area. One general alternative, that of taking no action, is discussed in section 5.1. Section 5.2 provides information on collection system alternatives, and in particular the important question of service area for the municipal wastewater facilities. Section 5.3 summarizes data on treatment alternatives and considers treatment processes, plant sites and potential wastewater reuse. Section 5.4 concerns alternatives for sludge management. Section 5.5 deals with the many other aspects of a wastewater management plan, including flow reduction and cost recovery. Section 5.6 summarizes the preliminary decisions which have been made by the City.

Discussions in Chapter 5 focus on key issues which bear on the selection of the 'best' (most cost-effective) alternatives. Technical details on these issues are presented as necessary in chapter 6.

5.1 THE NO ACTION ALTERNATIVE

For reference purposes it is useful to consider what would happen if Las Cruces makes no improvements to the existing wastewater management system. As stated in chapter 4, the existing plant violates effluent standards and is inefficient. The plant and the interceptor sewer system cannot fully accommodate existing development, much less projected growth. Failure to correct these problems would have at least two adverse effects. First, there would be continued violation of effluent standards, placing the City in jeopardy of enforcement actions beyond those described in section 4.1; such enforcement could include large fines and court-imposed remedial actions. Second, the lack of treatment and interceptor capacity could result in a system which is so overloaded that the City, on its own or as the result of enforcement or citizen-sponsored court action, would be forced to adopt a sewer-hookup moratorium which would limit or preclude development within the City. If this occurs, there probably would be widespread, uncontrolled growth on the prime agricultural lands of the Mesilla Valley outside the City limits, with wastewater service provided by septic tanks and a proliferation of independent treatment plants. Such growth would be contrary to appropriate objectives of land-use planning (see section 5.2.1 and 6.6.1).

Collectively these effects would have an adverse impact on residents of the area and would conflict with federal and state environmental regulations. For these reasons, the No Action Alternative is unacceptable. At a minimum, some steps must be taken to resolve the existing inadequacies in the treatment system, and to deal responsibly with the anticipated growth of the community.

5.2 ALTERNATIVES FOR WASTEWATER COLLECTION

5.2.1 Planning and Service Areas

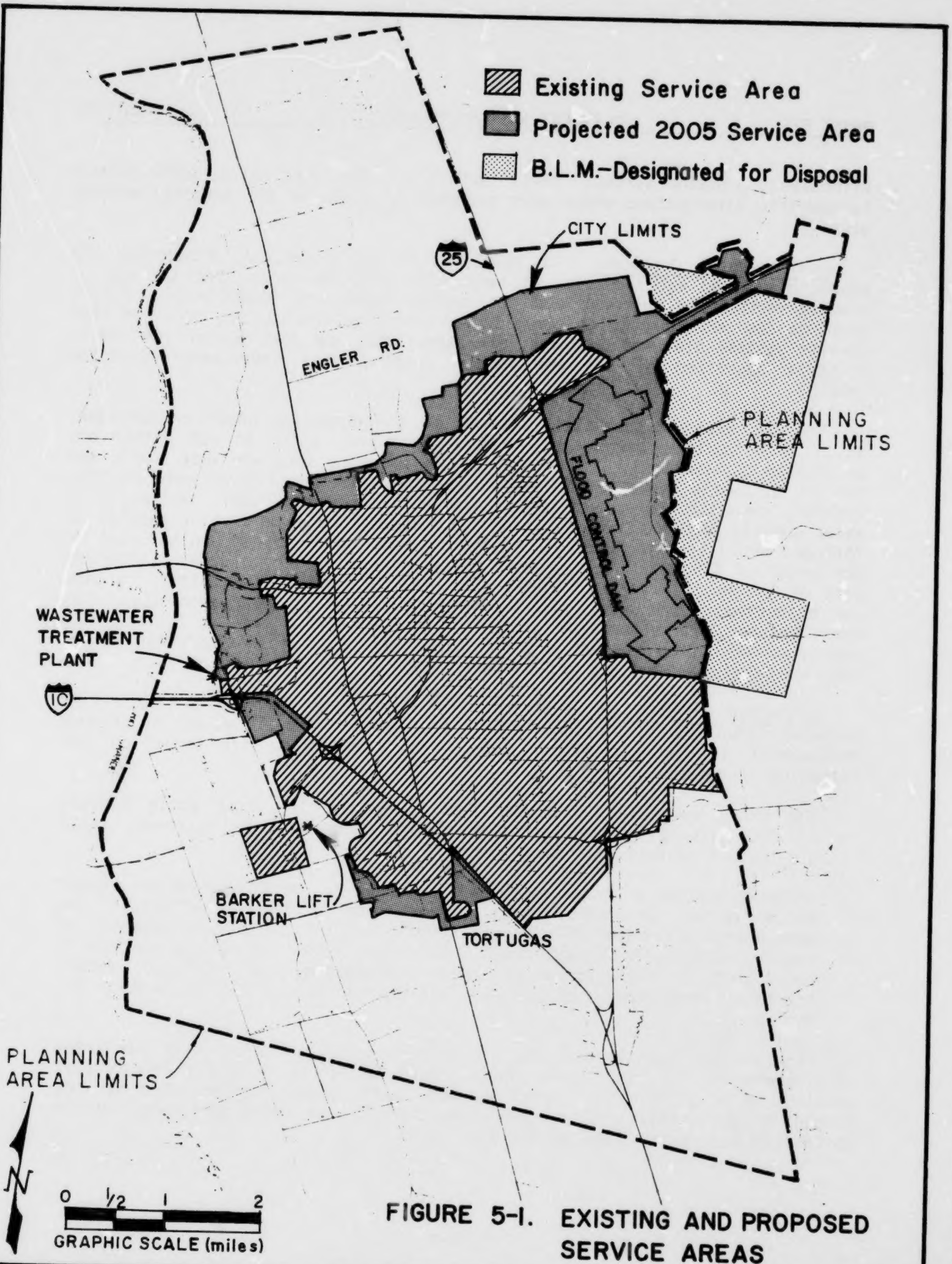
The planning area (refer to Figure 4-1 and 5-1) was established by agreement between the joint powers, the U.S. Environmental Protection Agency (EPA) and the New Mexico Environmental Improvement Division (EID). It is identical to the 208 planning area established by EID. The northern and southern boundaries were extended well into the rural Mesilla Valleys to reflect the potential for growth in these areas. The Rio Grande forms the western boundary because limited growth is expected west of the river in the next 25 years, and because the extension of major utilities in that area would involve considerable problems of access and cost.

The eastern boundary of the planning area generally reflects the existing limit of private lands. As discussed in 6.6.1, some federal lands which lie east of the planning area have been designated by the Bureau of Land Management for eventual urban use (see Figure 5-1). It is not known if these lands would be released to the private sector before the year 2005, although many area residents consider this to be very likely. Because the lands are not now available for development, they were not included within the planning area.

The most complex issue faced during the planning process was the determination of the most appropriate service area for the municipal wastewater collection system. The alternatives available included:

- limit collection lines to the existing service area, which is the heavily shaded region identified in Figure 5-1;
- extend lines throughout the facilities planning area, which is also shown in Figure 5-1;
- develop a collection system in an area which is intermediate in size between the existing service area and the facilities planning area.

The proposed service area, illustrated in Figure 5-1, was selected on the basis of four major factors: the need to solve environmental problems; the need to accommodate projected development patterns; the desire to reinforce land use planning objectives; and the goal of providing the most cost-



▨ Existing Service Area
▩ Projected 2005 Service Area
░ B.L.M.-Designated for Disposal
CITY LIMITS
25
ENGLER RD.
PLANNING AREA LIMITS
FLOOD CONTROL DAM
WASTEWATER TREATMENT PLANT
10
BARKER LIFT STATION
TORTUGAS
PLANNING AREA LIMITS
N
0 1/2 1 2
GRAPHIC SCALE (miles)

FIGURE 5-1. EXISTING AND PROPOSED SERVICE AREAS

effective collection system. These factors are discussed below, with respect to specific alternatives which were proposed in place of the selected service area.

Environmental Problems. As discussed in Section 6.2.2, throughout the planning area no water quality or sanitation problems exist from the use of on-site wastewater systems, such as septic tanks and drainfields. Future problems are not expected to occur in most of Dona Ana County, provided that on-site systems are used on relatively large lots, and that designs conform to criteria specified by the New Mexico Environmental Improvement Division (NMEID).

The one area of potential problems is the community known as Tortugas, which is occupied primarily by Tigua Indians (but which is not within any designated reservation). In this area many existing lots are very small, and the use of septic tanks generally requires the issuance of a variance by EID. However, community water service is available, and significant sanitation or water quality problems have not been identified. The extension of service to Tortugas would require a new lift station, with an estimated capital cost on the order of $75,000. As discussed below, the extension of sewers into any part of the Mesilla Valley, unless absolutely essential, is contrary to land use objectives which appear to be widely supported by the community. For these reasons, the alternative of extending the service area to Tortugas was not supported during the public participation process, and was rejected by the CAC, the Steering Committee and the Applicant.

Projected Development Patterns. As discussed in 6.6.2, facilities planning involved predictions about the amount and location of future development in the Las Cruces area. The predictions are based on the following procedures.

- The NMEID projected that the facilities planning area would contain 103,800 persons by the year 2005, which represents an extremely rapid growth rate of nearly 3 percent per year.
- The distribution of this growth was projected by the EIS consultant, based on a review of census data, inputs from community officials and developers, a review of historic development patterns, consideration of zoning, and tabulations of vacant residential land. Growth was assumed to concentrate in existing or proposed subdivisions, and on large, vacant tracts of land which are suitable for residential use due to location and zoning.

Figure 5-2 illustrates the distribution of existing and projected development in the Las Cruces area. Based on Figure 5-2, Las Cruces will develop in a relatively compact manner, with growth concentrated on the margins of the existing urban area. Specifically, as shown on Figure 5-2 and as described in more detail in Section 6.6.2:

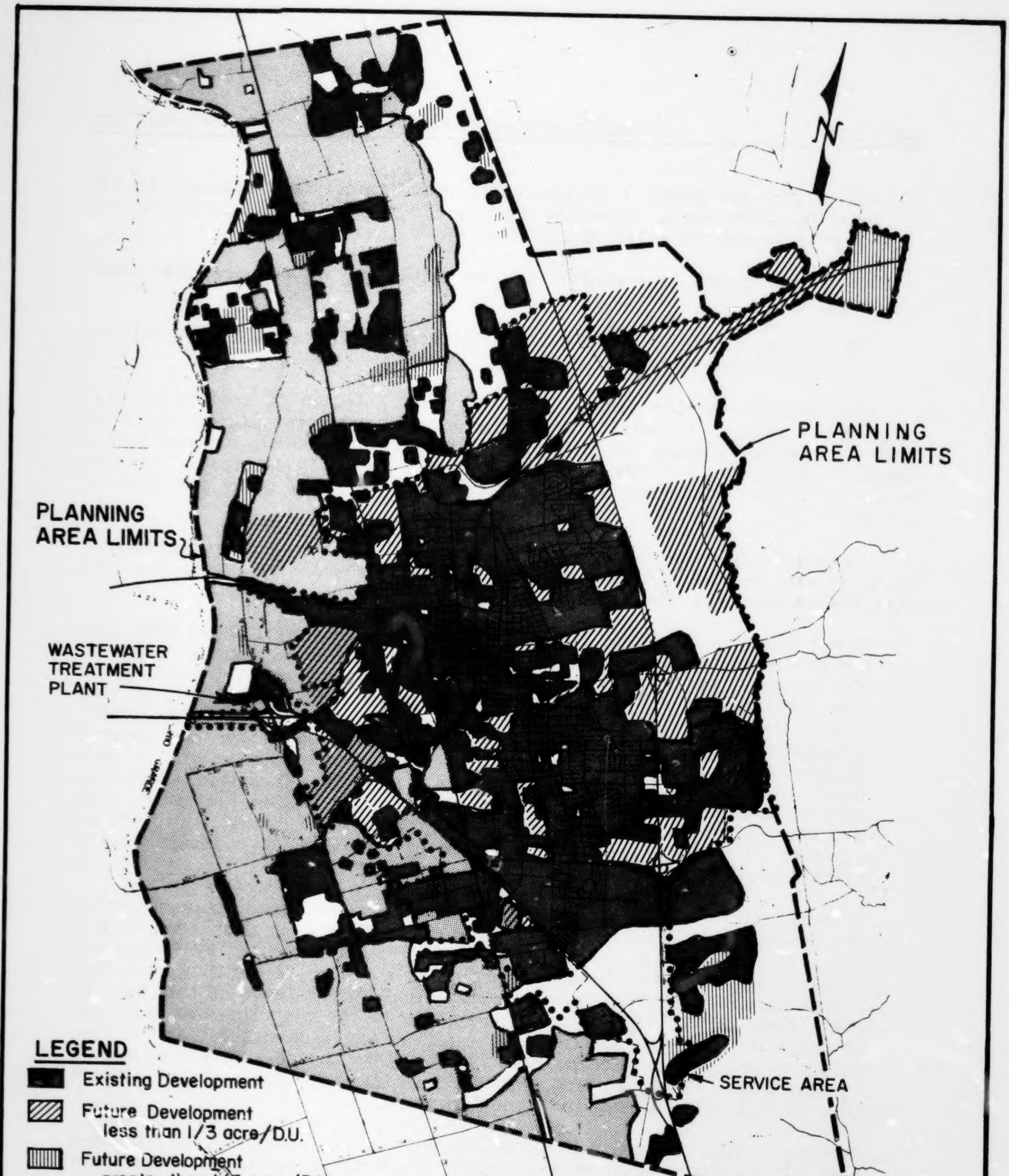

PLANNING AREA LIMITS
PLANNING AREA LIMITS
WASTEWATER TREATMENT PLANT
SERVICE AREA
LEGEND
Existing Development
Future Development less than 1/3 acre/D.U.
Future Development greater than 1/3 acre/D.U.
Significant Agricultural Lands
0
1/2
1
2
GRAPHIC SCALE (miles)
N

FIGURE 5-2. EXISTING AND FUTURE LAND USE PATTERNS

- 65% of the the growth is projected to occur immediately adjacent to the existing urban area, primarily east of Interstate 25 and north to and slightly beyond the existing city limits;
- 20% of the growth is expected to occur within the already developed urban area;
- 15% of the growth is expected in scattered developments in the Mesilla Valley north and south of Las Cruces.

The proposed service area (Figure 5-1) was selected to conform to this development pattern in detail, and would extend wastewater collection lines into the rapidly growing urban fringe (first category above), but not to the scattered developments elswhere in the Mesilla Valley. In particular, service would be limited to areas of urban density (4 dwelling units per acre or greater).

During the planning process, three areas of disagreement or controversy occurred with respect to the development projections shown in Figure 5-2 (and thus the service area shown in Figure 5-1).

- Some citizens and members of the CAC and Steering Committee believed that the predicted population for the entire planning area is too low, and that the sunbelt location of Las Cruces will spur growth which is more rapid than indicated in the projection provided by EID. As discussed in Section 6.6.2, the EID estimate is reasonably consistent with other available information and is considered as an appropriate value for the general purpose of facilities planning. To the extent that growth is more or less rapid than projected, the capacity of wastewater facilities would be reached somewhat earlier or later than indicated in the facilities plan and this EIS. However, changes in the growth rate (if any) would not be expected to invalidate any decisions or designs made as a result of the current planning process.
- As noted previously, it is possible that BLM land immediately adjoining the planning area on the east will become available for urban development prior to 2005. If so, the development patterns suggested by Figure 5-2 could change, with more growth occurring to the east of the City, and less elsewhere. Because there is no firm timetable for release of this land to the private sector, it is not included within the planning area and thus is not within the service area. However, it can be expected that the land will eventually be developed, even if not within the next 25 years, and it is appropriate for collection system alternatives to consider that service to this area will be needed at some future date.
- Representatives of Dona Ana County, including the County Planner, believe that there will be major development in the Mesilla Valley north and west of the urban fringe as mapped in Figure 5-2. Thus, they disagree with the service area shown in Figure 5-1, and believe it should be extended northward by at least one-quarter and perhaps one-half mile, to the

vicinity of Engler Road (see Figure 5-2). The suggestion to extend lines into the rural Mesilla Valley was not supported during the public participation process. Moreover, it was noted that: a) lines to serve the area in the future are unlikely to be eligible for EPA funding (thus nothing is gained by including them in the facilities plan); b) extensions of lines to the area remains a possibility if development does occur along the lines envisioned by County officials; c) any shift of projected population to the Mesilla Valley would require a shift from somewhere else which in turn would require a reduced service area elsewhere. The land use planning issues discussed below were also noted as presenting an argument against including the Engler Road sector within the service area boundaries. Futher details on the potential for such development are presented in Section 6.6.2.

After considerable public input, the CAC, Steering Committee and Applicant accepted the population distribution shown in Figure 5-2, and selected the service area as illustrated in Figure 5-1.

Land Use Planning Objectives. There is no current land use plan for Las Cruces or Dona Ana County. However, because Figures 5-1, 5-2 and 6-14 were exposed to considerable public comment, and were reviewed by City and County planners, they may be considered as an informal land use guide for the area. Certainly, the debate over the service area considered in some detail whether or not the projected development patterns were consistent with the objectives of land use planning which have been expressed by public officials and private citizens.

The land use implications of the selected service area are evaluated in detail in Section 6.6.1, and are summarized here. The major impacts relate to the preservation of the rich agricultural lands of the Mesilla Valley, and to the coordination of wastewater service with other public investments.

Based on the public participation process, there is a strong local sentiment to preserve agricultural lands from rapid urbanization, and thus to reverse the trend of recent years which has seen urban sprawl increasingly encroach onto the farms of the Mesilla Valley. The same philosophy is reflected in EPA policies, and reflects:

- the irreplaceable role of these lands in the production of food and fiber;
- their important role as a greenbelt and wildlife habitat in close proximity to an urban area;
- and the high value placed on the maintenance of a rural lifestyle for those who wish to retain a traditional way of life.

A particular problem is that the subdivision of some agricultural land tends to separate the remaining farms, thereby creating parcels which are less economical and efficient to farm using modern commercial methods.

Area residents do not necessarily agree on the best means for protecting the farmlands. While some would propose strict zoning to prohibit (or at least slow) the subdivision of farms, others wish to minimize interference with the open market and prefer such methods as special tax incentives for the maintenance of greenbelt lands. However, there appears to be widespread agreement that nothing should be done to actively encourage the conversion of agricultural land to urban uses. Thus, there was considerable public support for selection of a service area which would provide no special incentive for premature residential development of the farms of the area.

A continuation of development trends observed in the late 1970's would result in the loss of 7,000 acres of Mesilla Valley farmlands (see Section 6.6.4) by the year 2005. The urban land use pattern which would minimize such loss would be one which: a) is relatively compact, with most valley development occurring as infill to already urbanized sectors; and b) utilizes non-irrigated land for much of the new development. As shown in Figure 5-2, this is largely the urban form associated with the population projections. The selection of a service area to conform to the population projections thus fulfills the objective of minimizing impacts on agricultural lands.

It must be noted that the proposed service area is not a 'no-impact' alternative. Any collection system designed according to the limits of Figure 5-1 extends into some presently rural areas. Assuming that these areas all become developed, approximately 900 acres of viable agricultural land would be converted to urban uses. In addition, 1,100 acres of farmland would be developed beyond the limits of the sewer collection system. However, the total utilized farmland, 2,000 acres, is 5,000 acres less than would result from the current trend. Thus the prediction is that the rate at which farmlands are lost will be slowed considerably.

The proposed service area can be considered as having several environmental benefits, resulting from relatively minimal pressure on agricultural lands. These include: support for agricultural production of food and fiber, preservation of greenbelt/wildlife areas, comparatively minimal intrusion of urban activity (traffic, dust, noise) into rural areas, and reduced fragmentation of irrigated panels.

The water laws of New Mexico require that any increased use of water by the City of Las Cruces be offset by the retirement of irrigation (or other) water rights. As discussed in Section 6.6.4, it appears that the retirement of 900 acres of farmland (the amount to be served by the expanded sewer system) would provide enough water rights to sustain the population of Las Cruces through the year 2005. Thus, the loss of 900 acres of irrigated land is an inevitable result of area growth, and could not be avoided even if there were no expansion of the existing service area. However, to minimize impacts it will be important for the City to obtain the water rights from those lands to which it provides wastewater service.

The second major land use objective which was considered in the selection of a service area was the need to coordinate wastewater service with other public investments. As discussed in Section 6.6.4, growth can cause increased demand for many types of facilities and services. It is important that wastewater service not encourage growth in one part of the area, while other public and private funds are being directed toward the support of growth elsewhere.

The future development patterns indicated on Figure 5-2 enhance the potential for phased and coordinated investments in development. The major growth areas are within or immediately adjacent to the city limits, requiring minimal extension of utilities and services. Further, the direction of growth, to the north and east, is in conformance with the many capital projects that have been planned and budgeted previously for these areas (including recent investments of $4 million and planned investments of $30 million for water, sewer, highway, school and flood control facilities; see Table 6-14). In contrast, less than $3.25 million worth of public infrastructure expenditures is planned for projects located south and west of Las Cruces in areas where new growth is to be relatively limited.

Cost-Effective Criteria. The ideal collection system combines two features: minimum cost within the constraints of the service that must be provided; and maximum flexibility in the event development patterns depart from those which are expected. As will be discussed in Section 5.2.2, the service area selected by the Applicant appears to meet these objectives. In particular, the construction of new interceptors to accomodate new development north and east of Las Cruces is also necessary to solve existing problems of overloaded lines; that is, there are no major improvements required just because the service area would be extended. Also, the main area of controversy over future growth is relatively near the treatment plant (Engler Road sector; see Figure 5-1), where the capacity of any new interceptor would be large; thus capacity would be available if development patterns so require.

Summary. The selected service area responds to a projected population distribution which minimizes impacts on agricultural lands, while protecting public investments. In order to achieve this logical and efficient pattern of growth, land use and development policies and regulations would need to be implemented and enforced by local governmental jurisdictions. Even with a good land use pattern, the growth itself will have many significant impacts, including a large increase in the need to convert agricultural water rights to municipal water rights.

Table 5-1 shows how the population and wastewater flow from the service area would increase over time. By 2005, the service area would contain 92,000 persons, of whom 90,000 would be hooked up to the collection system. Coupled with industrial sources, these residents would produce 8.9 million gallons per day (mgd) of wastewater.

TABLE 5-1. EXISTING AND PROJECTED WASTEWATER FLOWS.

Year	Population in Service Area 1/	Total Average Flow Gallons/day 2/	Total Flow Acre-feet/year
1980	51,275	4,600,000	5,153
1985	59,000	5,372,000	6,017
1990	67,000	6,092,000	6,824
1995	76,000	7,460,000	8,356
2000	84,000	8,180,000	9,163
2005	92,000	8,900,000	9,969

1. Remainder of planning area population will be served by on-site wastewater systems.

2. Refer to Glossary for definition. Includes adjustment for industrial flows.

Source: Molzen-Corbin, 1981a.

5.2.2 Collection and Interceptor Alternatives

There is no alternative to the development of a well-designed and maintained collection system. This means that it is necessary to: a) remedy the problems of the existing system, to the extent practicable; and b) expand the system so that it can accommodate increased flows from the projected population growth. The selection of routes for prospective interceptors involves environmental, engineering, and economic factors. The major environmental concerns include the need to minimize: the effects of construction noise, dust and equipment emissions; disruption of traffic, utility service, business activities and other community services; potential impacts to the natural environment (e.g. sensitive soils, habitats); removal and replacement of pavement; and routing of lines through areas where development may not be appropriate (e.g. farmlands). These general concerns are reflected in the proposed routes for interceptors in Las Cruces, as will be noted below. In some cases, as where the only available routes have nearly identical environmental characteristics, the choice of the best approach reflects engineering and economic considerations, and the selection process is analyzed in the facilities plan, rather than in this EIS. The discussion which follows is in part a summary of the facilities plan, and considers environmental factors only in cases where one alternative has unacceptable impacts, or when two alternatives are very similar in cost, but differ as to environmental implications.

Remedial Actions. Appendix A discusses the condition of the existing collection system, including lift stations. The sewer lines are generally in good condition, except for four minor problem areas shown in Figure 5-3. Table 5-2 summarizes these problems and the corrective actions proposed by the facilities plan. The only existing problem with interceptor lines is overloading, which must be solved in the context of areawide modification to the sewer system. System expansion to accommodate growth is discussed in the next sub-section.

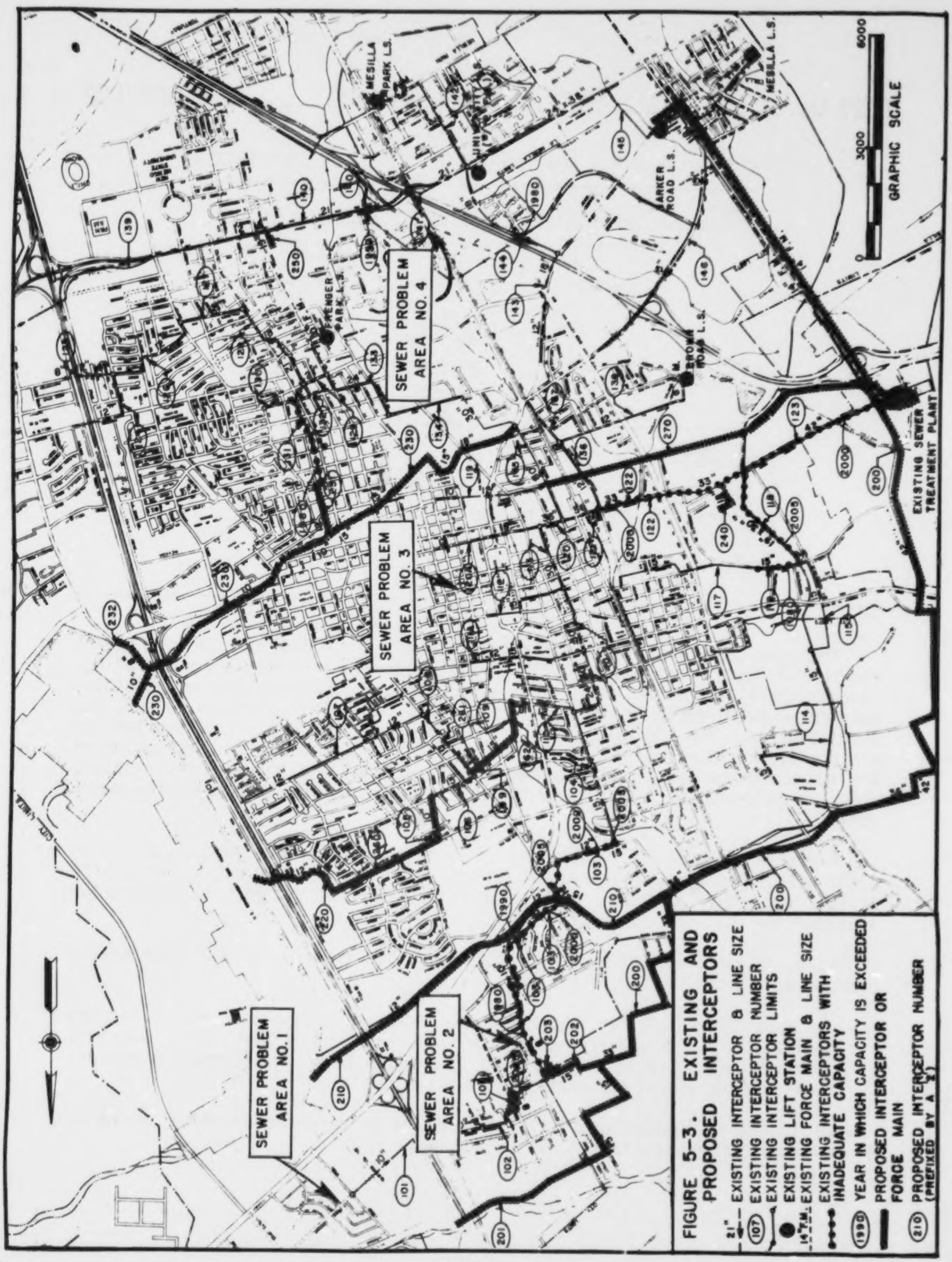


FIGURE 5-3. EXISTING AND PROPOSED INTERCEPTORS

21" EXISTING INTERCEPTOR & LINE SIZE
107 EXISTING INTERCEPTOR NUMBER
EXISTING INTERCEPTOR LIMITS
● EXISTING LIFT STATION
14" F.M. EXISTING FORCE MAIN & LINE SIZE
EXISTING INTERCEPTORS WITH INADEQUATE CAPACITY
1990 YEAR IN WHICH CAPACITY IS EXCEEDED
PROPOSED INTERCEPTOR OR FORCE MAIN
210 PROPOSED INTERCEPTOR NUMBER (PREFIXED BY A 2)
SEWER PROBLEM AREA NO. 1
SEWER PROBLEM AREA NO. 2
SEWER PROBLEM AREA NO. 3
SEWER PROBLEM AREA NO. 4
MESILLA PARK L.S.
MESILLA L.S.
PARKER ROAD L.S.
BROWN ROAD L.S.
FRENGER PARK L.S.
UNIVERSITY L.S.
EXISTING SEWER TREATMENT PLANT
0
3000
6000
GRAPHIC SCALE

TABLE 5-2. PROPOSED REMEDIAL ACTION FOR COLLECTION SYSTEM.

PROBLEM AREA (Fig. 5-3)	GENERAL LOCATION	PROBLEM	CORRECTIVE MEASURE
1	Northeast of I-25, U.S. 70 Interchange	Sand enters lines	City to repair manholes
2	Elks Drive	Sand settles in lines	Addressed in interceptor alternatives
3	Mesquite St.	Line steps up into manhole	See note below
4	Main St. and Valley Drive	Odor problems from line with low slope	Continue regular cleaning; enforce oil and grease regulations a/

a. This will not fully solve the problem, but is the only alternative available.

Note. For problem area 3, the corrective measure consists of constructing approximately 55 feet of new 6-inch sewer line within the existing right-of-way to eliminate a "step-up" into the receiving line. (See Figure II-8 in the Facilities Plan). The estimated cost for this improvement is $4,800.

Source: Molzen-Corbin, 1981a.

The condition of the six existing lift stations is descibed in Appendix A; Figure 5-3 locates these facilities. All lift stations need some upgrading; also there is a general desire to eliminate as many stations as possible, because of maintenance and energy costs, odors, and other problems. Thus, for each station, the facilities plan considered three major categories of alternatives: elimination, reconstruction, or replacement. The evaluation of the alternatives can be illustrated by considering the Barker lift station, which is presently overloaded, and which is the only facility requiring major work.

Pressure sewers (lift stations at each hookup) were considered as an alternative for serving areas south of the treatment plant; however the initial screening performed in the facilities plan indicated this alternative would not be cost-effective.

Five specific options were considered for correcting the overloading problem at the Barker lift station.

- 1) Elimination of the facility was rejected because it would require construction of a gravity sewer line to a depth of 36 feet, which would be costly even if practical; there would be significant environmental impacts from dewatering and replacement of a State road.
- 2) Increased pumping capacity was rejected because the existing structure will not accomodate the necessary new pumps.

- 3) Diversion of part of the flow upstream of the lift station was considered to be cost-effective. The specific concept is to use Interceptor 250 to intercept a portion of the flow of Interceptor 139, which now all goes to the Barker lift station, and to instead divert this portion to the Frenger Park station (see Figure 5-3).

- 4) Installation of a new force main parallel to the existing force main was determined to be a cost-effective approach, as it would eliminate the bottleneck caused by the inadequate capacity of the existing line. The excess flow remaining after item 3 above would be accomodated by installation of a parallel 16 inch force main.

- 5) Installation of a new station was rejected because of greater costs, when compared to installation of a new force main.

Similar analyses for other stations indicated that, as for Barker, reconstruction is the preferred alternative. Table 5-3 summarizes the proposed renovations at each station, and indicates the costs of the improvements. The work generally addresses the need to meet safety standards and to insure structural integrity.

Growth. The need for an expanded collection system stems directly from the projected increase and distribution of population within the service area (Figures 5-1, 5-2). The facilities plan includes an extensive analysis of each existing interceptor line and lift station, to determine if and when population growth will cause flows to exceed line capacity. This analysis is summarized in Table A-1 of Appendix A and also, for interceptors, shown in

TABLE 5-3. ESTIMATED COSTS FOR RENOVATING LIFT STATIONS.

Lift Station	Estimated Costs
Barker Road New pumps and motors, piping modifications, valve pit structure, odor control, emergency power, construction, new force main, misc.	$ 897,000
Brown Road Rebuild wet well, odor control, alarm, misc.	55,000
Frenger Park Odor control, emergency power, alarm, misc.	61,000
Mesilla Park Odor control, alarm, misc.	35,700
Town of Mesilla New pumps and motors, odor control, misc.	58,100
University Odor control, emergency power, alarm, misc.	58,700
TOTAL	$1,162,700

Source: Molzen-Corbin, 1981a.

Figure 5-3. Generally, overloading is beginning to occur on the northeast edge of Las Cruces and in the southeast section. Additional overloading is projected all along the northeastern side of the city.

The basic alternatives for interceptor construction are prescribed by the projected growth patterns; lines must be installed where and when needed, and sized to accomodate the anticipated flow. However, there often are two or more routing alternatives for a particular line. The major factor determining the options is right-of-way. Impacts such as traffic and utilities disruption are minimized where rights-of-way pass through undeveloped land. On the other hand, use of existing rights-of-way may save purchase (or condemnation) costs, and may be less disruptive. In-town arroyos often satisfy both requirements, since they provide a publically owned right-of-way which passes through developed areas, yet can be used for construction with minimal disruption of existing development patterns. However, the construction of sewer lines in arroyos can have adverse potential effects, especially increased potential for erosion. As discussed in Section 6.1.3, such impacts are not expected to be significant in the Las Cruces setting, provided that mitigation measures are undertaken during project design and construction. (Note, the use of sewer rights-of-way for dual purposes, such as bike trails, is precluded because most lines are sited along roads or in arroyos.)

To accomodate existing and projected overloading, three major categories of interceptor alternatives were considered.

- 1) Parallel existing interceptors with new ones; this approach uses existing rights-of-way and is generally feasible when construction impacts will be minimal.
- 2) Divert some of the flow into an existing line which has adequate capacity; this tends to be a comparatively inexpensive choice in those few cases where an overloaded line is close to one with excess capacity.
- 3) Build new interceptors from developed and developing areas to the treatment plant. (Construction actually begins at the plant and progresses upstream.) This approach is most effective when it allows selection of a right-of-way along an arroyo or outside already developed areas; in these cases the significance of construction impacts is lessened.

All three concepts are proposed in various parts of the Las Cruces interceptor system. A major factor in the selection process was the need to minimize construction impacts, by selecting routes which do not follow major thoroughfares in developed areas. By routing interceptors in arroyos or along as yet undeveloped roadways, it is possible to minimize utility relocations, traffic disruption, access limitations, and impacts of construction noise and dust. Figure 5-3 gives the location of proposed interceptors; Table 5-4 summarizes costs of the lines. To minimize the costs and impacts of reconstruction, all lines have been sized to accomodate growth over a 40-year period.

TABLE 5-4. SUMMARY OF ESTIMATED INTERCEPTOR COSTS.

INTERCEPTOR NUMBER	COST BY PROJECT YEAR REQUIRED 1980	1985	1990	1995	2000	2005
140[1]	$ ---	$ ---	$ ---	$21,900	$ ---	---
144[1]	35,000	---	---	---	---	---
200	6,160,000	---	---	---	---	---
201	---	---	---	---	372,600	---
202	74,800	---	---	---	---	---
203	16,100	---	---	---	---	---
210	125,400	---	347,300	---	---	---
220	---	125,400	---	---	---	---
230	337,000	---	---	---	---	---
230	565,900	---	---	---	---	---
231	80,500	---	---	---	---	---
232	---	27,600	---	---	---	---
240	44,900	---	---	---	---	---
250	---	9,200	---	---	---	---
260[2]						
261[2]						
262[2]						
270[2]						
TOTAL	$7,440,900	$162,200	$347,300	$12,900	$372,600	

[1] Siphon replacement
[2] Not required during planning period

Source: Molzen-Corbin, 1981a.

Interceptor system 200 is the major undertaking proposed (see Figure 5-3), costing about six and one quarter million dollars, including lines 201, 202, and 203. System 200 would relieve existing overloading and accomodate projected growth in the northeast portion of the service area, using an entirely new route directly from relatively undeveloped (but projected to be developed) land to the treatment plant. The size of the line (36-42 inches over much of the route) will necessitate deep excavations, with consequent severe construction impacts if the line is routed through a developed area. Alternative routes slightly to the south were rejected due to the potential for disruption of existing facilities and development. The alternative of extending stub-outs north towards Engler Road was proposed as a means of providing service to that part of the north valley which is outside the service area, but which County officials believe has significant development potential; this option was rejected for the reasons discussed concerning definition of the service area (see Section 5.2.1).

Existing overloading and projected growth in the central part of Las Cruces and to the east would be served by the extension of existing interceptors. Several alternatives routes were considered for each interceptor, with the prefered alternatives being those with the lowest cost and overloading potential and with the least potential for adverse impacts associated with construction on major thoroughfares through business and residential neighborhoods.

Overloading from Barker lift station to the treatment plant is proposed to be relieved by installation of a parallel force main from the existing lift station to the treatment plant along State Route 292 (see Figure 5-3).

There are two principal impacts of the prospective sewer construction. The first is the long-term effect on land use, which relates especially to the selection of the service area and which was summarized in section 5.2.1. The second is the short-term effect of construction, which is described in section 5.2.3, below.

5.2.3 Summary of Construction Impacts

Sewer construction normally involves a sequence of actions, the most significant of which are: surface disturbances, such as by breaking pavement; excavation of a deep but normally narrow trench (less than 10 feet wide); laying of pipe and refill of the trench with necessary compaction and restoration of the original surface. Associated activities include moving of equipment to and from the site, and on-site storage of equipment, pipe and excavated fill. The duration of the sequence at any one site varies according to construction schedules, from a minimum of several days to a normal maximum of several months. During much of this period the site is inactive. The most intense activity occurs during the period of trench excavation and refill, each normally accomplished within one or two working days. More prolonged construction can occur when sewer installations are combined with other utility installations.

Potential impacts from construction are identified in Table 5-5. Impacts on earth resources are primarily soil disturbance and possible erosion, which may occur throughout the period of construction. In Las Cruces, construction would take place in several settings, each with its own set of environmental constraints.

a) Many of the proposed interceptors (e.g. lines 260 and part of 270, Figure 5-3) and the one replacement of a collector line would be installed beneath existing streets and roads. Impacts such as dust, noise and traffic disruption are of special concern. Valley locations are typified by a shallow water table and canals; dewatering may be normally necessary, and special measures must be taken when crossing irrigation structures. As discussed in section 6.5, some lines pass near historic buildings; special measures may be needed to avoid impacts to building foundations.

b) Other interceptors (e.g. 200, remainder of 270) sewer lines are expected to follow existing or proposed rights-of-way along dedicated but unbuilt streets, or along another utility easement. It is likely that construction would precede full development in these areas, and it is probable that in some cases construction would alter a previously undisturbed surface. Specific impacts cannot be identified until detailed routes are selected during project design. In general impacts such as noise or traffic disruption would be much less than in already developed areas. There would be an increased potential for disturbance of archeological or biological resources.

TABLE 5-5. ENVIRONMENTAL IMPACTS OF CONSTRUCTION ACTIVITIES.

*Indicates effects which may be long-term.

CONSTRUCTION ACTIVITIES	IMPACTS
I. Sewer construction	
A. Obtaining easements and rights-of-way*	Change in land values; change in land use
B. Site clearing/construction of access roads*	Surface change; vegetation change; soil removal and disturbance; change in visual quality; waste disposal; equipment operation; traffic rerouting; possible archaeological and historic site disturbance
C. Trench excavation, pipe laying, and trench backfill	Surface change; soil removal and disturbance; change in visual quality; dewatering; blasting; equipment operation; traffic rerouting; possible archaeological and historic disturbance; utility disruption or relocation
D. Site restoration*	Surface change; vegetation change; change in visual quality; waste disposal; equipment operation; traffic rerouting
E. Other activities	
1. Onsite storage of equipment, pipe, excavated soil	Surface change; change in visual quality
2. Equipment travel to and from site	Equipment operation; traffic rerouting
3. Security and safety	Surface change; change in visual quality; traffic rerouting
4. Support activities (dust control)	Change in visual quality; soil treatment; equipment operation
II. Sewage treatment plant construction	
A. Obtaining easements, rights-of-way, and acquiring site*	Change in land values; change in land use;
B. Site clearing and access roads*	Surface change; vegetation change; soil removal and disturbance; change in visual quality; waste disposal; equipment operation; possible archaeological and historic site disturbance
C. Construction of facilities*	Surface change; soil removal and disturbance; change in visual quality; dewatering; blasting; equipment operation; possible archaeological and historic site disturbance; waste disposal; equipment operation
D. Site drainage and grading*	Surface change; vegetation change; soil removal and disturbance; change in visual quality; waste disposal; equipment operation; possible archaeological and historic site disturbance
E. Site restoration*	Surface change; vegetation change; soil treatment; change in visual quality; equipment operation
F. Other activities	
1. Safety fencing*	Change in visual quality
2. Support activities (dust control)	Soil treatment; equipment operation
3. Bypassing sewage	Normally not permitted; if required, special facilities constructed

Source: Wilson (1981).

c) Two major interceptors (210 and 230) would be located in arroyos. These lines, in Alameda and Las Cruces Arroyos, would have special impacts associated with flood and erosion hazards. The impacts, which can be controlled through mitigation measures, are discussed in sections 6.1.3 and 6.2.5.

d) Construction impacts associated with renovation of odor control and lift stations would be very localized and minor; all activity would be within the existing sites.

For the planning area as a whole, approximately 16 miles of new sewer lines would be installed by the year 2005; most of this would be built in the 1980's.

Construction impacts can be significantly reduced by selective use of mitigation measures. The development of such measures will take place in the design and construction phases of each construction project. During project design, sites will be defined precisely. On-site inspections will identify environmentally sensitive resources which may be adversely affected. For example, an archaeological survey would be required as a condition of any EPA Step 2 grant, and can be performed once interceptor routes have been specifically identified. Such a survey will identify sites to be salvaged or avoided; project rerouting can be accomplished if necessary. Prior to project construction, the contractor must develop any environmental protection plans required by the contract guidelines; in turn these guidelines may reflect conditions of the Step 3 grant. During construction, inspection procedures will be utilized to ensure that the guidelines are followed. The municipal excavation ordinance provides an additional mechanism for review and enforcement of contractor activity.

Throughout the process outlined above, it is important to determine that the measures being taken are cost-effective. This can be accomplished by using flexible contract specifications which establish performance criteria for the contractor, but allow discretion in the selection of control techniques.

Specific mitigation measures which may be appropriate in Las Cruces are listed in Table 5-5. A control technique which applies to almost all impacts is to manage the extent of construction to limit the duration of impacts at any one site. This is commonly accomplished by restricting the length of an open trench to the distance between manholes (a maximum of 400-500 feet); in some cases the length of disturbed areas ahead of and behind the trench may also be specified. Since the trenching phase of the project is relatively brief and tends to move rapidly along the line, these restrictions normally ensure that the nuisance impacts of construction are short-lived at each particular location.

TABLE 5-6. CONSTRUCTION IMPACT MITIGATION MEASURES.

Note: for Las Cruces, no blasting is proposed, hence measures to mitigate the use of explosive materials are not included in this table.

1. Construction of catch-basins to retard and desilt storm flows from a site.

2. Grade a slight mound along trenches not in street rights-of-way, to provide positive drainage and prevent erosion of backfill earth.

3. On slopes, use excavated soil to direct runoff around construction sites.

4. Schedule construction so that earth-moving is not premature, but begins immediately before actual construction facilities; avoid seasons of high rainfall or wind, if possible.

5. Mark construction or cleared areas on the ground and restrict vehicle activity to marked zones so that unnecessary injury to vegetation is avoided.

6. Reuse excavated materials as backfill or rip-rap, if quality of material is adequate; else dispose of in a sanitary landfill.

7. Provide secure storage for all fuels or chemicals stored on site; use no herbicides or defoliants.

8. Dispose of vegetation spoil by landfill; open burning must not occur.

9. Use dust control measures (watering, soil stabilization, reseeding) where appropriate.

10. Construction noise levels should not exceed EPA and OSHA standards.

11. Minimize danger and interference with traffic by using signals, barricades, flagmen, and traffic rerouting, where appropriate.

12. Project public from construction hazards by using barriers, signal lights and temporary fencing, where appropriate.

13. Clean up, regrade and seed the altered area immediately upon completion of construction.

14. Minimize aesthetic impacts by maintaining a trim site, providing for proper handling of solid and liquid wastes, and by thoroughly cleaning up site as part of restoration activity at end of project.

15. Cross irrigation canals in winter; where a flowing structure must be crossed, install by boring beneath the structure.

16. There must be no bypassing of sewage.

Source: EPA, 1977b

5.3 Alternatives for Wastewater Treatment and Disposal/Reuse

Las Cruces must construct treatment facilities which will: a) solve the treatment deficiencies described in chapter 4; and b) provide the capacity required by the projected wastewater flow increases listed in Table 5-1 (8.9 mgd by the year 2005). The alternatives involve different kinds of engineering concepts for expanding or replacing the existing plant. These include methods of wastewater treatment (discussed in section 5.3.1) and possible options for wastewater recycling (section 5.3.2). The City also has considered alternative locations which could be used in place of or in addition to the existing plant site (section 5.3.3).

5.3.1 Treatment Process Alternatives

To meet the objectives of wastewater managment upgrading and expansion, 15 alternatives were considered during the facilities planning process. The evaluations involved two major steps: screening; and tradeoff analysis.

Screening. An initial analysis, termed 'screening', determined that many of the proposals were unrealistic because of severe engineering, environmental or economic constraints. This screening actually involved two phases. The first eliminated those alternatives with very obvious drawbacks; the second was based on a closer look at the options which remained.

Table 5-7 lists the fifteen alternatives which were evaluated, and states the results of the screening process. As shown in the table, five of the options were eliminated because of readily apparent problems; and another three were rejected after a more thorough evaluation. Thus seven of the original fifteen alternatives were subjected to a detailed analysis.

Two of the rejected alternatives involved land application, in which wastewater would be treated by reusing the water on farmland. These alternatives received some public support, but are not considered appropriate for Las Cruces for reasons discussed in section 5.3.2.

Tradeoff Analysis. The in-depth evaluation of the seven remaining alternatives is described in the facilities plan (Molzen-Corbin, 1981a, 1981b), and involved preparation of schematic flow diagrams and detailed cost estimates. As identified in the plan, the alternatives are as follows (see glossary for definition of technical terms).

1. 2.9/6.0 combination: renovate the existing plant to provide 2.9 mgd of activated sludge treatment (the organic capacity of the existing plant); build a new 6.0 mgd activated sludge plant.
2. Oxidation tower: build a new trickling filter plant using synthetic media.
3. Activated sludge: build a new activated sludge plant.

TABLE 5-7. SCREENING OF WASTEWATER TREATMENT ALTERNATIVES.

An asterisk (*) indicates alternatives which were initially considered suitable for a detailed evaluation (cost analysis), but which were rejected after additional screening.

ALTERNATIVE (8.9 mgd capacity unless noted)	RESULTS OF SCREENING EVALUATION
A. Renovate existing plant to provide 2.9 mgd activated sludge treatment; construct parallel activated sludge plant of 6.0 mgd	Potentially cost-effective; should be subjected to detailed evaluation
B. Renovate existing plant to provide 4.2 mgd activated sludge treatment; construct parallel activated sludge plant of 4.7 mgd	Rejected because of excessive costs associated with renovations of existing plant*
C. New trickling filter plant using rock media	Rejected; unable to meet NPDES standards consistently
D. New trickling filter plant using synthetic media (oxidation tower process)	Potentially cost-effective; should be subjected to detailed evaluation
E. New plant, activated sludge process	Potentially cost-effective; should be subjected to detailed evaluation
G. New plant, extended aeration process	Rejected due to long detention time and high costs involved
H. New plant, rotating biological contactor process	Potentially cost-effective; should be subjected to detailed evaluation
I. New plant, activated bio-filter process	Potentially cost-effective; should be subjected to detailed evaluation
J. New plant, roughing filter followed by abbreviated activated sludge process	Potentially cost-effective; should be subjected to detailed evaluation
K. New plant, physical-chemical process	Rejected due to high cost and sophisticated level of operation
L. New plant, oxidation lagoon process	Rejected due to requirement for 850 acres of land (mostly prime farmland), resulting in excessive environmental impact and dollar cost
M. New plant, aerated lagoon process	Potentially cost-effective; should be subjected to detailed evaluation
N. New plant, aquaculture process	Rejected because available engineering data are not sufficient to permit adequate design; also excessive land requirements*
O. New plant, primary treatment followed by land application on a new farm	Rejected because would create new water use in a water-short area (see 5.3.2)
P. New plant, primary treatment followed by land application on an existing farm	Rejected due to acreage requirements and likely impact on ground water (5.3.2)

- 4. RBC: build a new plant using rotating biological contactors.
- 5. Bio-filter: build a new plant using activated bio-filters.
- 6. Roughing filter: build a new plant using a roughing filter (trickling filter) followed by abbreviated activated sludge.
- 7. Aerated lagoons: build 200 acres of aerated ponds.

Table 5-8 lists the seven options in order of total dollar cost (beginning with the least expensive); capital (construction) and operational costs also are given. The first four alternatives listed in the table (numbers 3, 6, 5, 1) cost about the same; to build and operate these plants for 20 years one would need to have about $18 million in the bank today. In comparison, the remaining alternatives (numbers 7, 4, 2) are considerably more expensive.

As described in section 4.2, the selection of the most cost-effective alternative is based on factors other than dollar costs. So, it is necessary to compare the different options with respect to a number of economic, engineering and environmental issues. This can be accomplished through use of a 'rating table', in which each treatment process is ranked from 1 (best) to 3 (worst), based on its performance with respect to each issue.

For the Las Cruces EIS and facilities plan, rating tables were developed by the EIS and engineering consultants and reviewed during the public participation process. The resulting ratings are given in Table 5-9. Eight issues were used in rating the alternatives.

- Dollar costs reflect the economic performance of each alternative. The least expensive alternatives are rated 1. Because of anticipated cutbacks in federal funding, most costs will be paid through substantially increased sewer rates or local taxes.
- Energy use contributes to dollar costs, but is a separate issue because: a) all energy costs are borne by the local citizens; b) energy conservation is an important national economic and environmental issue; and c) the existing plant has an excessive energy burden, caused by the make-shift nature of the current "activated sludge" plant. The most energy-efficient alternatives are rated 1.
- Operational features reflect engineering factors; a rating of 1 is given to alternatives which best combine ease of operation, reliability, and process flexibility. Note, however, that successful operation depends much on personnel training and hiring policies.
- Adaptability to differing conditions refers to the potential for changed federal and state regulations, as discussed further on p. 5-25. Such changes could lead to revisions to the NPDES permit in Las Cruces, including a less stringent limit for removal of organic matter and suspended

TABLE 5-8. SUMMARY OF COSTS OF SEVEN TREATMENT ALTERNATIVES.

All costs in 1980 dollars.

Alternative	Number	Initial Capital Cost	Site Salvage Value	Annual Operation & Maintenance Costs	Equivalent Present Worth of All Costs
New Activated Sludge Plant	3	$ 12,516,000	$ 216,730	$ 509,010	$ 17,708,000
New Roughing Filter/Activated Sludge Plant	6	12,749,000	216,730	501,760	17,867,000
New Activated Bio-Filter Plant	5	13,129,000	216,730	550,750	18,299,000
Renovate Existing 2.9 mgd Plant & Build New 6.0 mgd Activated Sludge Plant	1	11,319,000	216,730	724,550	18,732,000
New Aerated Lagoons	7	23,083,000	3,612,000	575,275	20,288,000 *
New Rotating Biological Contractor Plant	4	16,477,000	216,730	496,790	21,543,000
New Oxidation Tower Type	2	18,357,000	216,730	575,970	24,239,000

Source: Molzen-Corbin, 1981a

* Cost figures have been adjusted to reflect savings because this alternative requires no sludge treatment or disposal.

TABLE 5-9. RANKING OF WASTEWATER TREATMENT ALTERNATIVES.

Evaluation Parameters	Alt. 1 2.9/6.0 Combination	Alt. 2 Oxidation Tower	Alt. 3 Activated Sludge	Alt. 4 Rotating Biological Contactors	Alt. 5 Activated Bio-Filter	Alt. 6 Roughing Filter Activated Sludge	Alt. 7 Aerated Lagoons
Dollar Costs	1	3	1	2	1	1	2
Energy Use	3	3	1	1	2	1	3
Operational Ease and Reliability	3	2	2	2	2	1	3
Process Control Flexibility	3	3	1	3	2	2	1
Adaptability to Future Conditions	3	3	2	3	2	2	3
Environmental Considerations	3	1	1	1	2	1	3
Interim Solution	3	3	2	2	1	1	3
Public Acceptance	2	3	1	2	3	1	3
TOTAL	21	21	11	18	16	10	21

Source: Molzen-Corbin, 1981a; Lee Wilson and Associates, 1981a

1 is 'best'; 3 is 'least desirable'.

solids. Relaxation of the standards, which could occur only if there would be no unacceptable water-quality impacts, would probably permit Las Cruces to use a simpler treatment process (such as trickling filters) rather than a more complex process (activated sludge, or other aeration method). It is also possible that some standards might be made more stringent, although no such proposal has been made for the Las Cruces area. A rating of 1 identifies alternatives which are most easily modified in the event permit requirements are altered.

- Environmental considerations encompass factors beyond those covered by the other issues. The rankings distinguish the alternatives on the basis of odor control, resource conservation (water, agricultural land, sewage byproducts, energy), and improvements to water quality. This is discussed in Chapter 6.

- Interim solutions is an issue of special importance to Las Cruces, because the existing plant is in violation of its NPDES permit and is subject to an EPA Administrative Order which mandates permit compliance. A rating of 1 identifies alternatives which would most easily be phased in as soon as practicable, to solve the existing problem of an organically overloaded plant.

- Public acceptance reflects citizen reactions to the alternatives. Citizen input has placed a high value on those alternatives which: a) are low in dollar cost and energy use; b) provide an interim solution to the the existing treatment problem; and c) are adaptable to possible changes in regulatory requirements.

Assuming that each issue is of equal importance, the simple adding of the ratings gives a total score for each alternative; the options with the lowest score are most desirable. The results are shown in Table 5-9 and indicate that alternative 3 (activated sludge) and alternative 6 (a roughing filter coupled with activated sludge) appear to be most cost-effective.

Alternative 3 is a conventional concept, involving the construction of aeration basins to provide activated sludge treatment. The alternative should not be confused with the existing plant, which is termed an 'activated sludge' facility, but which does not conform to modern design principals. Alternative 3 is slightly less expensive than alternative 6 and even more economic when compared to the other alternatives. From an engineering standpoint, it is the most efficient and reliable facility (if properly designed, constructed and operated).

Alternative 6 is a somewhat unusual approach, intended to reduce the costs of activated sludge treatment by providing an additional pretreatment step using a 'roughing filter', which is a trickling filter (8.9 mgd capacity) which would produce an effluent of reasonably good quality (about 60 BOD, 60 TSS), but not adequate to meet existing standards. The filter effluent would be 'polished' by abbreviated activated sludge treatment which would be less extensive than the treatment provided in alternative 3. This could reduce the overall costs of treatment, since less would be spent on expensive, energy-intensive activated sludge processing. However, based on the cost analysis for conditions in Las Cruces, it turns out that the reduced cost of using only an abbreviated activated sludge process is about matched by the added expense of the trickling filter process (Molzen-Corbin, 1981a). Thus, as shown in Table 5-8, alternative 6 actually is slightly more expensive than conventional activated sludge treatment (though the difference in costs is very small, considering that the estimates themselves are approximate). However, as discussed below, alternative 6 has many special advantages in the Las Cruces situation, because: a) portions could be built immediately (at reduced cost) in order to solve the existing problem of NPDES compliance; and b) if NPDES regulations were relaxed, the full plant need never be built, and the costs of treatment would be substantially reduced.

Immediate construction of the roughing filter portion of alternative 6 would allow the existing flow of about 4.6 mgd to be split between the new facilities and the existing plant. The existing facilities can treat 2.9 mgd and meet NPDES standards. The remaining flow would go to the trickling filters and, because the filters would be operating at far less than their design capacity of 8.9 mgd, the effluent from these units would also be expected to meet standards. (Were all the flow to pass through the trickling filters, instead of half going to the existing plant, the filters would no longer be so greatly underloaded, and could not meet the standards.) As Las Cruces grows, and the volume of wastewater increases (Table 5-1), the trickling filters would gradually become overloaded (with respect to meeting current NPDES standards), and in a period of a few years the activated sludge polishing units would need to be in place (and the existing plant abandoned), or the facility might not comply with regulations.

The issue of changes to NPDES standards was debated by Congress during 1981, and was considered important in the evaluation of alternatives. Congress passed H.R. 4503, which was signed by President Reagan on December 29, 1981. In Section 23 of the new act, Section 304d of the Federal Water Pollution Control Act was amended by addition of the following paragraph:

> "(4) For the purposes of this subsection, such biological treatment facilities as oxidation ponds, lagoons, and ditches and trickling filters shall be deemed the equivalent of secondary treatment. The Administrator shall provide guidance under paragraph (1) of this subsection on design criteria for such facilities, taking into account pollutant removal efficiencies and, consistent with the objective of the Act, assuring that water quality will not be adversely affected by deeming such facilities as the equivalent of secondary treatment."

Under this provision, the possibility exists that Las Cruces would be permitted to accomplish secondary treatment through use of facilities such as a trickling filter, if the EPA Administrator determines that water quality will not be adversely affected. EPA's proposed approaches to implementation of the new law are identified in an Advanced Notice of Proposed Rulemaking, Revision of Secondary Treatment Information Regulation 40 CFR 133, to be published in the Federal Register in late January, 1982.

The options under consideration include a proposal to modify the testing procedure under which BOD compliance is determined, and another to eliminate the current requirement by which 85% of the influent BOD must be removed. With reference to treatment requirements, alternatives include redefining the BOD effluent limit for secondary treatment, from 30 mg/l at present, to 45 mg/l or higher. In lieu of a revised standard, the approach could be to establish standards according to treatment process, geographical area and/or season. In this case, EPA could set a range of limits and let the state or permit writer set the exact limits for each facility. Finally, the law could be implemented by granting an across-the-board variance for trickling filters for some as yet undetermined effluent limit. A final decision is expected by the end of the year. Interim guidance is expected to assist EPA's Construction Grants Program to continue to function effectively (EPA, 1982).

Based on the amended law, it is possible that the NPDES permit for Las Cruces would be changed in a way which would allow the City to operate a trickling filter plant, without additional polishing by activated sludge. If so, the new trickling filters would stand alone as the main wastewater treatment facilities; the existing plant could be abandoned and the activated sludge portion of alternative 6 would never be built. This would reduce the costs of alternative 6 substantially.

Alternative 3 lacks these advantages. If it is selected, the City would need to implement the entire alternative as soon as practicable and could not easily scale-down the facility in the event regulations are relaxed. For these reasons, and based on public input, the City has identified alternative 6 as the preferred choice over alternative 3.

None of the other alternatives is really competitive with these two options. Alternative 5 would cost only slightly more than alternatives 3 or 6, and is the highest rated of the five remaining choices. However, it is more energy intensive than activated sludge, and when compared to alternative 3, is less adaptable and much less practical as an interim solution. Alternative 1 involves continued use of the existing, inefficient plant, a fact which adversely affects all of the rating parameters. All the remaining processes would be considerably more expensive, and have no special advantages which would justify the added costs. Alternative 2 is the most expensive and, while easy to operate in many ways, is relatively inflexible. Alternative 4 has high construction costs and lacks flexibility, but has the lowest operational costs. Alternative 7 is expensive and requires a great deal of land and energy. However, it is the simplest to operate.

5.3.2 Alternatives for Wastewater Reuse

All the treatment alternatives which were analyzed in detail propose to continue the present practice of discharging wastewater to the Rio Grande. No wastewater will be recycled directly for agricultural, industrial, recreational, or other uses. As discussed in section 6.2.1, the waters of the Rio Grande are fully appropriated and utilized. All wastewater discharged to the river is effectively reused downstream, because it becomes part of the surface or ground waters used for irrigation in the Mesilla, El Paso or Juarez valleys. Thus, continuation of the present practice involves no waste or loss of the resource.

Alternatives which would put the wastewater to a more direct type of reuse, such as land application on a farm, would reduce the discharge to the river. Because the stream is fully appropriated, the City probably would need to 'replace' or offset the reduced discharge, by obtaining and retiring irrigation water rights. Thus, there would be no net gain in water supplies for the City or the area. In such cases, reuse is of interest only if: a) the reuse itself provides some wastewater treatment; or b) the treated wastewater can substitute for higher-quality drinking water. There are no examples of the second situation in Las Cruces; thus reuse was considered only to the extent that it could be combined with treatment.

Land application provides such a combination of wastewater treatment and reuse, and was considered in the facilities plan. The option is feasible only if it involves already existing farms, which could trade their water rights to the City in return for a guaranteed supply of wastewater. The wastewater would receive primary treatment, prior to use on the farms; controlled irrigation with the water would provide substantial additional treatment of organic matter, nutrients, pathogens and many other contaminants.

There are many practical problems with this alternative. First, to treat all of the Las Cruces sewage would require about 5420 acres of farmland, which is a very large portion of all the acreage south of Las Cruces to the state line. Second, these farms would need to be cultivated for cotton or other non-food-chain crops, in order to avoid contamination problems. This eliminates pecans, chile, and most of the vegetable crops in the area and thus precludes use of many farms in the area. In particular, it eliminates most of the large tracts which are in single ownership, so that to assemble the acreage would require the use of several dozen farms under various ownerships, probably including lands many miles from Las Cruces. Fourth, an expensive pipeline or canal system would be needed to convey the wastewater to each of these farms. Fifth, because of the shallow ground water the wastewater could be applied only at a relatively slow rate, during periods of minimal rainfall; thus substantial (and expensive) storage facilities (ponds) would be needed. Sixth, City supervision of farming practices would be required to ensure that the reuse program meets environmental standards; it is not certain that individual farms would agree to such controls.

Collectively, these problems clearly indicate that land application is not a viable alternative. The same problems apply, at a reduced scale, if only a portion of the wastewater is treated by land application. For example, the facilities plan considered land application of only that wastewater which is pumped by the Barker lift station; this would permit elimination of this lift station and its parallel force mains, and it would reduce the flow which is subject to expensive activated sludge treatment. About 974 acres would be needed. Even assuming that the various management problems noted above could be solved, this alternative was five million dollars more expensive than if the same flow is pumped uphill to the existing plant, and subjected to conventional treatment.

5.3.3 Alternative Plant Locations; Staging Alternatives

Alternative treatment plant locations were considered early in the facility planning process. The existing site is generally suitable for continued use, but has two possible drawbacks: a) it is fairly distant from the growth areas in northeast Las Cruces; and b) lift stations are required to transport wastewater collected in the southern part of the service area. For this reason, the facilities plan considered relocation of the plant, or construction of a second plant to the north (nearer the growth areas, hence saving on the costs of major interceptors), or to the south (hence eliminating lift stations).

None of these alternatives appear to be even marginally cost-effective. Relocation of the existing plant to the north simply adds to lifting costs from the south; and moving it to the south adds to the costs of interceptor construction from the north. The present location is the most efficient given the existing layout of the collection system.

Construction of a second plant north or south of the existing facility does reduce collection system costs; however, based on data given in the facilities plan the added costs of treatment substantially outweigh these savings. A specific example, involving land application, is discussed in section 5.3.2, above.

The facilities plan also evaluated whether or not the new treatment facilities could be built in stages. Because most of the capacity is needed in the immediate future, there is no dollar savings from constructing a portion of the year 2005 capacity now, and then expanding the plant at a later date.

5.4 Alternatives for Sludge Management

Sludge (residual solid material) is a major product of wastewater treatment. A primary purpose of facilities planning is to determine the best methods for: a) treatment (stabilization) of the rich organic matter which occurs in sludge; and b) disposal or reuse of this material in an environmentally sound manner (to minimize or avoid problems such as odors, vectors, and ground-water contamination). As was the case for wastewater treatment, the alternatives involve different kinds of engineering concepts, which in this case combine treatment and disposal. An exception is that, if the aerated lagoon alternative were selected, no sludge management would be

TABLE 5-10. SCREENING OF SLUDGE MANAGEMENT ALTERNATIVES.

Evaluations marked with an asterisk (*) were eliminated in the more detailed screening phase, because of high costs or other factors.

ALTERNATIVE	RESULTS OF SCREENING EVALUATION
THICKENING	
Dissolved Air Flotation	Rejected; high capital, energy costs; high level of sophistication*
Gravity	Cost-effective because of low cost, ease of operation, reliability, and performance nearly equivalent to other choices; should be included in detailed alternatives where thickening is a necessary process step
Centrifuge	Rejected; extremely high capital and energy requirements*
Thickening of Primary Sludge	Not necessary, but can be considered if done in an existing digestor or clarifier that would otherwise be abandoned; in practice, this is feasible for Las Cruces
STABILIZATION	
Lime	Rejected; high energy and chemical costs; treated sludge has minimal reuse potential*
Chlorine	Rejected; adds to effluent salinity; may produce carcinogenic byproducts; uses a relatively expensive, hazardous chemical
Anaerobic Digestion a/	Potentially cost-effective; should be subjected to detailed evaluation
Aerobic Digestion	Rejected; energy intensive, no longer appropriate to Las Cruces situation
Thermal conditioning	Potentially cost-effective; should be subjected to detailed evaluation
Composting	Potentially cost-effective; should be subjected to detailed evaluation
DEWATERING	
Vacuum Filter	Rejected; high cost; sludge still too wet for landfill; process not needed for wet land application*

TABLE 5-10 (Continued.)

Belt Filter Press	Lowest cost of the mechanical methods, and potentially cost-effective preceeding composting; otherwise sludge would be too wet for landfill; process not needed for wet land application
Pressure Filter	Rejected; high cost; sludge still too wet for landfill; process not needed for wet land application*
Centrifuge	Rejected; energy intensive; sludge still too wet for landfill; process not needed for wet land application*
Drying Beds	Potentially cost-effective; should be subjected to detailed evaluation; only suitable method if sludge is to be landfilled; however not suitable preceeding composting because of odors associated with raw sludge
Drying Lagoons	Rejected; major source of uncontrollable odor
FURTHER TREATMENT (chemical, heat, irradiation, special composting)	Rejected; appropriate for high-value reuses for which no market has been identified in Las Cruces; remains an alternative at some future time; for now stockpiling accomplishes same basic objective
DISPOSAL	
Reuse by Land Application (sale or giveaway to public; application to city parks)	Rejected; see text
Wet Land Application (no public access or food chain crops)	Potentially cost-effective; should be subjected to detailed evaluation
Incineration	Rejected; considered inappropriate for a small community because of costs, complexity, uncertain energy benefits
Cogeneration (burn refuse and sludge)	Rejected; poor energy balance, high costs at this small a scale
Refuse/Sludge composting	Rejected; has not been found to be cost-effective in demonstration projects
Landfill of raw sludge	Rejected; potential ground water pollution (or high cost of liners)
Landfill of stabilized, dewatered sludge	Potentially cost-effective; should be subjected to detailed evaluation

a. Methane recovery is practicable from this process

Source: Molzen-Corbin, 1981a

needed; the costs of the alternative have been adjusted to reflect the resulting savings (see Table 5-8) .

There are several potential steps in sludge management, including thickening, stabilization, dewatering, further treatment, and disposal. (See chapter 10, Glossary, for definition of terms.) There are multiple options for each step, and in combination these produce literally hundreds of alternatives. The approach used in the facilities plan was to screen out many of the options for each step, and then to evaluate in detail a few major alternatives which effectively combine the remaining processes.

Screening. Table 5-10 lists the sludge management alternatives which were considered in the facilities plan, and it identifies processes which were rejected because of engineering, environmental or economic constraints. The screening involved several phases, in which alternatives were progressively eliminated until a relatively small number of basic choices remained.

Evaluation of the alternatives is complicated because EPA regulations regarding sludge management are undergoing revision. It is anticipated that the regulations will be stringent. The application of sludge to the land (as in City parks, or from giveaway to citizens who use sludge as a garden or lawn fertilizer) may pose significant hazards associated with the pathogens in the sludge, and the possible build-up of cadmium if the sludge is applied to food chain crops. Therefore, if the sludge is to be applied to the land, EPA would require measures to ensure that the public is not exposed to pathogens (restricted public access and/or special treatment), with additional controls if food chain crops are involved. Conversely, if the sludge is to be disposed of in a landfill, the landfill must meet special environmental standards. These restrictions restrict the potential for sludge reuse (or add to the costs of that reuse).

During the planning process, alternatives involving sludge reuse were rejected because of: the uncertainty as to final regulatory requirements; the lack of market for sludges to which public access must be restricted; and the probable high cost of producing a sludge to which public access need not be restricted. Thus, all alternatives considered in detail involve disposal of sludge without reuse. Note, however, that all methods involve a kind of stockpiling, such that the material could be recovered at some future date if and when reuse options become more favorable. The act of stockpiling in itself reduces pathogen levels until the material is relatively safe for public use and, through time, it accomplishes the same benefits as would result from adoption of a costly treatment process.

Tradeoff Analysis. Based on the screening, gravity thickening of primary and secondary sludge is appropriate as part of any sludge management scheme. Four alternatives were developed for stabilization, dewatering and disposal of the sludge (Molzen-Corbin, 1981a). These were analyzed based on schematic flow diagrams and detailed cost estimates. The alternatives are as follows (see glossary for definition of technical terms).

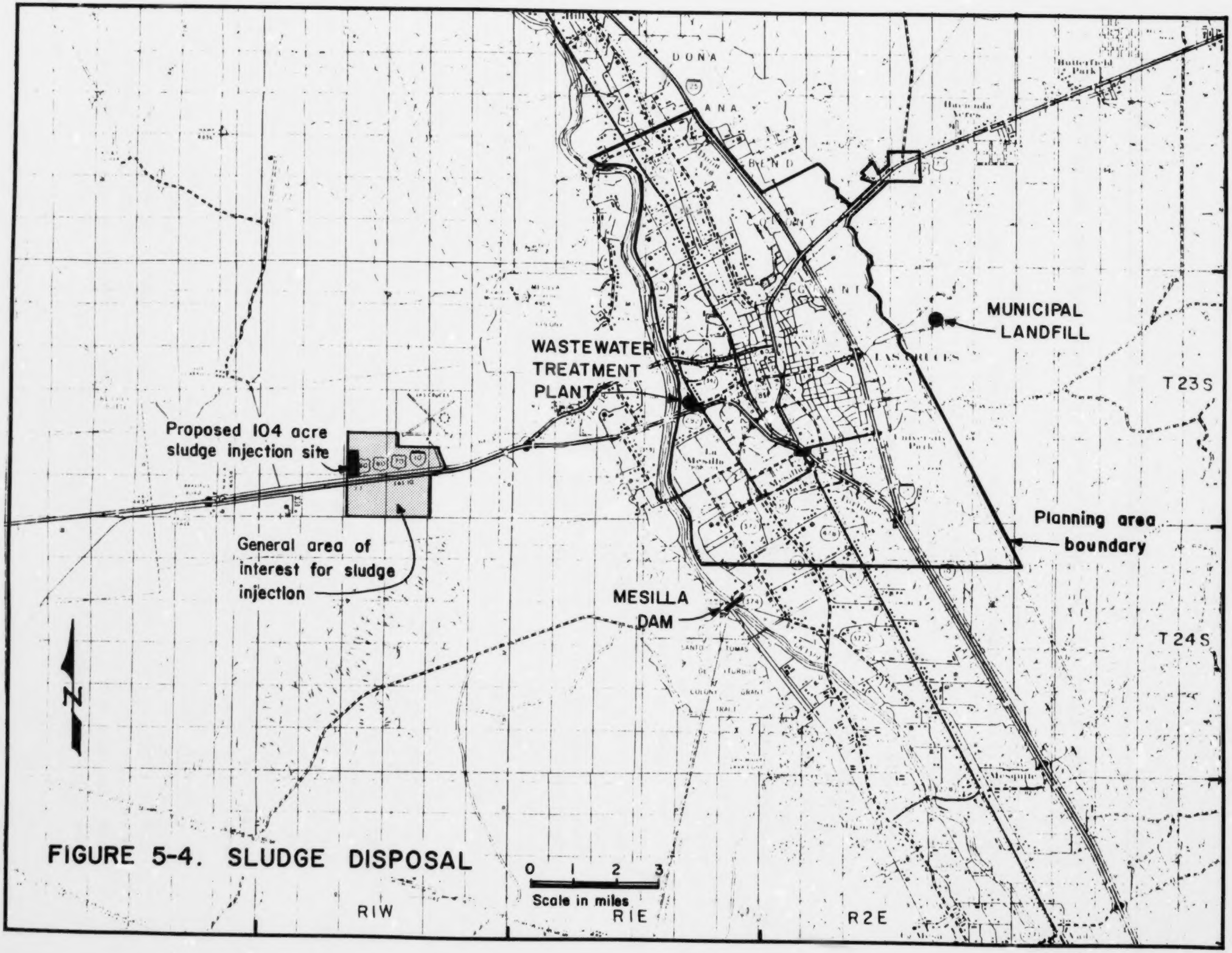

MUNICIPAL LANDFILL
Planning area boundary
WASTEWATER TREATMENT PLANT
Proposed 104 acre sludge injection site
General area of interest for sludge injection
MESILLA DAM
DONA ANA
BEND
GRANT
LAS CRUCES
La Mesilla
University Park
Mesquite
Butterfield Park
Hacienda Acres
SANTO TOMAS DE ITURBIDE COLONY GRANT
T23S
T24S
RIW
RIE
R2E
N
0 1 2 3
Scale in miles

FIGURE 5-4. SLUDGE DISPOSAL

TABLE 5-11. SUMMARY OF COSTS OF FOUR SLUDGE MANAGEMENT ALTERNATIVES.

All costs in 1980 dollars.

Alternative	Initial Capital Cost	Site Salvage Value	Annual Operation & Maintenance Costs	Equivalent Present Worth of All Costs
Anaerobic Digestion/Wet Sludge Land Application (Injection)	$6,875,000	$162,500	$264,830	$9,582,000
Anaerobic Digestion/Drying Beds/Landfill	8,980,000	144,500	198,230	10,987,000
Thermal Conditioning/Drying Beds/Landfill	8,127,000	144,500	375,790	11,964,000
Filter Press/Composting/Landfill	6,150,000	144,500	737,280	13,711,000

Source: Molzen-Corbin, 1981a.

TABLE 5-12. COMPARISON OF SLUDGE MANAGEMENT ALTERNATIVES.

Rankings of 1 (best) to 3 (least desirable) are accompanied by quantification of impact which is associated with rating.

Factor	Alternative 1: Anaerobic digestion; wet application (limited access site)	Alternative 2: Anaerobic digestion; drying beds; landfill	Alternative 3: Thermal conditioning; drying beds; landfill	Alternative 4: Filter press; composting; landfill
A. RESOURCE USE				
Dollar Costs	1 $9,766,000	2 $10,987,000	2 $11,964,000	3 $13,711,000
Energy Use	1 143,000 kwh/yr 14,700 gals fuel/yr	1 143,000 kwh/yr 9,900 gal fuel/yr	3 1,184,000 kwh/yr 10,300 gal fuel/yr	3 1,533,000 kwh/yr 83,400 gals fuel/yr
Labor	2 16,540 person-hr/yr	1 12,380 person-hr/yr	2 16,900 person-hr/yr	3 25,800 person-hr/yr
Materials	1 $44,500/yr	1 $42,100/yr	2 $120,300/yr	3 $262,200/yr
Land Requirements	3 40 acres	1 1/2 acre/yr	1 1/2 acre/yr	1 1/2 acre/yr: perhaps a little more than alt. 2 or 3
SUBTOTAL	8	6	10	13
B. RESOURCE RECOVERY				
Can methane be recovered?	1 Yes	1 Yes	2 Yes, if supernatant treated as sidestream rather than returned to head of plant. Energy recovery about balances with capital cost. Unproven technology, but should work.	3 No
Fertilizer Value	2 Most nutrients retained, but difficult to apply to crops.	1 Nutrients retained, easy application	3 Much nitrogen lost in process; but product is good soil conditioner)	1 Similar to alt. 2

TABLE 5-12 (Continued.)

Potential For Use On Soil	1	After one year, can dig up the peat-like soil for use as a conditioner	3	May have to wait 5 years to retrieve from landfill.	2	Wait may not be as long, since sludge is sterile when landfilled.	2	As alt. 3
Cost Recovery Potential	3	Have to wait 1 yr to sell. Diluted by soil.	3	Have to wait 1 yr to sell. Significant land area required for storage in meantime.	1	Can sell sludge within one month.	1	As alt. 3
SUBTOTAL		7		8		8		7
C. OPERATION								
Ease and Flexibility Of Equipment Operation	1	Sophisticated process but mostly familiar or easy to learn.	1	Sophisticated process but familiar to operators	2	Requires close monitoring dedicated operators. Very sophisticated equipment.	3	Requires close monitoring. Sophisticated process and equipment.
Process Control	3	Biological process subject to upsets	3	Biological process subject to upsets	1	Physical process which tends to be stable	2	Subject to reasonable control of main factors (air, time)
Safety	1	Little danger from process itself. Potential of exposure of public to pathogens if they ignore no trespassing signs at disposal sites.	1	As alt. 1	3	High pressure and temperature process. Requires regular use of nitric acid.	2	High temperature process: possible excessive inhalation of fungus spores (*Aspergillus fumigatus*).
Interim Solution	1	Can buy trucks and land as needed; no construction required; no "fixed" equipment.	2	Need to construct many new drying beds.	3	Fixed equipment. Not modular, so total expense up front.	3	As alt. 3
SUBTOTAL		6		7		9		10
D. IMPACTS								
Odor Potential	1	Primary potential from digester. Possible odor at disposal site, distant from populated areas	3	Primary potential from digester and drying beds.	2	Sludge odor more obnoxious, but less pervasive than digested sludge. May smell worse on drying beds, but dewaters readily, so won't sit out as long.	3	Goes through lots of processes at plant before treatment that deodorizes.
Bacteria/Viral Safety	2	Public access must be controlled for one year after application, on 40 acres	3	Landfill may protect cysts for years.	1	Process produces nearly sterile sludge.	1	As alt. 3
Potential for Ground Water Pollution	2	Slight to moderate risk; monitoring may be needed	1	Considered minor for proper site	1	As alt. 2	1	As alt 2
Public Acceptance	1	Lowest cost existing facilities.	2	Known method. Uses more existing facilities	3	New method	3	Costly
SUBTOTAL		6		9		7		8
TOTAL RATING		27		30		34		38

Source: Lee Wilson and Associates, Inc.

1. anaerobic digestion; wet sludge injected into soil at a site where there is no public access nor growth of food chain crops;
2. anaerobic digestion; drying bed dewatering; landfill disposal;
3. special thermal conditioning process; drying bed dewatering; landfill disposal;
4. belt filter press dewatering; composting; landfill disposal.

Initially, alternative 1 was developed with a prospective land application site adjacent to the existing plant site. However, such a location has a significant potential for ground-water pollution, because the water table is within 5-20 feet of the land surface. Therefore it was proposed that the injection site be located on the West Mesa somewhere within a four square mile area near the municipal airport. Figure 5-4 shows the actual area which is proposed for acquisition; it is a 104-acre tract with easy access from the highway. Actual injection of the wet sludge (using specially designed trucks and trailers) would be on a dedicated area of approximately 40 acres; this would be sufficient so that each portion of the area would be used for sludge injection once each year. The rest of the land would be available for disposal of wastes when digesters are cleaned and for emergencies.

The dollar costs of the four alternatives are summarized in Table 5-11. Alternative 1 is the lowest-cost option by a substantial margin; alternative 4 is by far the most expensive.

The four alternatives were ranked on their relative costs and benefits according to a number of criteria, similar to (but more detailed than) the approach used for wastewater treatment alternatives. The results are summarized in Table 5-12. This table incorporates engineering evaluations from the facilities plan plus environmental considerations. Total points for each alternative are given, with a lower score indicating a "better" alternative. However, note that the criteria are not weighted; that is, each factor is treated with equal importance by the rating scheme. Should public opinion consider a particular criterion to have overwhelming importance, an alternative which meets that criterion might be favored, even if it has a higher point score on Table 5-12.

The criteria used to evaluate the alternatives can be divided into four categories (with some overlap). Category one is resource use, that is, the amount of money, energy, labor, materials, and real estate that a given sludge handling and disposal system consumes. Alternatives 3 and 4 are significantly more resource intensive than alternatives 1 and 2. If all factors are weighted equally (as shown in the table), alternative 2 is shown as more resource efficient than alternative 1. This is primarily because alternative 1 requires considerable land plus fuel for transport of sludge. However, alternative 1 involves much less capital investment than alternative 2. This shows up in the cost figures of Table 5-11, but has only a small influence on the ratings of Table 5-12. If dollar cost is considered the primary measure of resource efficiency, then alternative 1 clearly is superior.

Balancing resource use is the potential of resource recovery. Sludge-related resources potentially include: methane gas, which can be burned to generate energy for operation of the treatment plant; compost; and the sludge itself, which can be made into an animal feed supplement, or used directly as a soil conditioner. For all alternatives, the final sludge product is an organic material which has some fertilizer value and is a good soil conditioner. Sludge applications improve soil properties such as humus content, fertility, water-holding capacity, cation-exchange capacity, and soil aggregation. Nitrogen and phosphorus generally make up 2-3% of a typical municipal sludge, which in itself does not make the material a complete fertilizer. However, the nutrients are in the organic form and are released to the soil slowly, which is an ideal trait for a soil conditioner. There are some hazards associated with sludge application: potential leaching of nitrates from the application site into the ground water; build-up of heavy metals (especially cadmium) in the soil and in vegetation grown at the site; bacterial or viral infection of persons who come into contact with the sludge.

The suitability of sludge for reuse is dependent on the treatment process used and on EPA regulations, which are undergoing revision. Because of the uncertainty of future regulations, all alternatives call for terminal disposal of the sludge. Thus the primary potential for reuse of the sludge depends on the ease of going back and recovering sludge from its disposal site. The alternatives are also evaluated based on their ability to produce sludge for a "bagging and selling" operation (instead of land disposal), should EPA regulations so permit. For alternative 1, it is assumed that the sludge is injected, then the humic soil recovered and sold at cost.

Based on Table 5-12, the alternatives all have significant potential resource benefits and are broadly comparable as to their ratings. Alternative 1 provides methane gas, and the disposed sludge is reasonably available for recovery and reuse as a soil conditioner. Alternative 2 also provides methane and its sludge is the best from a soil fertilization point of view; however it also poses the greatest risks if distributed to the public. Alternative 3 produces the safest product for resale, but the nutrient content of the product is less than for the other options; also production of methane gas would be more costly. Alternative 4 produces a good product for public use, but no methane gas to aid in operation of the treatment plant.

The third category of evaluation factors given in Table 5-12 deals with the operation of the sludge facilities. Alternatives 3 and 4 generally present greater problems in operation, because they involve sophisticated technology; alternatives 1 and 2 use somewhat less advanced techniques, which are more familiar to the existing staff. However, the processes of alternatives 1 and 2 are less stable than those of the other options, and are especially subject to upsets which may be outside operator control (e.g. if a slug of toxic material discharges to the system).

The evaluation of 'interim solutions' indicates that alternatives 1 (and to a lesser extent number 2) are the easiest to implement in stages, and thus offer the prospect of a partial solution to the existing operating problems at the treatment facility.

The fourth evaluation factor reflects various environmental impacts. Sludge is one of the greatest sources of odor at a treatment plant, and therefore the alternative selected has ramifications for the overall public acceptability of the treatment plant. Alternative 1 is given the best rating because, even if there are odors, they will occur away from populated areas. Drying beds are usually the worst offenders, and so alternative 2 has a less desirable rating. The bacterial/viral content of the sludge relates to the potential for the sludge to transmit disease; the actual likelihood of such will depend on how the sludge is disposed. Ideally, the sludge should be totally sterile.

Sludge can have adverse impacts on groundwater due to leaching of nitrate and heavy metals from the disposal site. All four alternatives dispose the sludge on the mesa, where the water table is fairly deep and the potential for ground water pollution is low. Alternative 1 poses the greatest risk to ground water, since the sludge is applied wet, and thus contaminated water has more potential to seep down to the groundwater. It is possible that EID would require a monitoring plan for this alternative; see section 6.2.7. The lowest risk is from alternative 3, because the treatment process removes much of the nitrogen in the sludge.

Public acceptance is included in this section since to chose an unpopular alternative would presumably have a negative impact on people's perception of their environment. In this case, public opinion was primarily influenced by cost considerations.

Based on Table 5-12, alternative 1 has the lowest or "best" rating, due to its low use of resources and its operational simplicity and flexibility. Even if the score for this option were somewhat higher than the others, it has the great advantage of lower cost. The evaluations of Table 5-12 reveal no factor which would cause a higher cost alternative to be cost-effective. Alternative 2 has the main disadvantage of requiring drying beds, which increase costs and odor potential, and somewhat decreases the ease of implementing this option. Alternative 3 has a poorer rating despite the fact that it produces a sterile, stable sludge; the high costs are not balanced by any immediate market which could utilize this better product. The same basic problem is responsible for the relatively poor score for alternative 4.

5.5 OTHER ALTERNATIVES

The development of a complete wastewater management system requires consideration of many factors beyond basic treatment concepts. This section discusses methods for addressing the remaining components of an effective facilities plan (keeping in mind that the plan, like the EIS, is a draft document subject to revision). For many components the planning effort developed a single 'most effective' approach, because of the general need to provide the best practicable treatment works in Las Cruces.

5.5.1 On-Site Systems; Septage Disposal

As discussed in Section 6.2.2, the continued use of on-site systems is appropriate for Las Cruces for areas outside of the service area. Two different policies are available for management of on-site systems. One approach would be to defer to EID regulations and have that agency continue full jurisdiction over new systems. The other approach would be for the City of Las Cruces and/or the County of Dona Ana to adopt and enforce their own on-site systems management policies. This approach would be appropriate if special problems existed or were anticipated. However, no such problems are known at this time. In addition, local management of on-site systems would add to existing financial and administrative burdens. Therefore the preferred alternative is to defer to existing EID regulations.

A negative feature of this alternative is that EID lot size regulations are not designed with land use goals in mind. Instead, they protect ground water by spacing septic systems on large lots. Specifically, EID regulations will not produce clustered development, a land-use pattern which may be desirable in the area. The alternative remains for the County to enact land-use regulations rather than to allow EID's wastewater regulations to be the *de facto* land use plan outside the wastewater service area.

At present, septage (septic tank pumpings) is disposed of at the Las Cruces sanitary landfill. The landfill is considered suitable for the disposal of such material, as evidenced by EID approval of use of the landfill for sludge disposal (see Appendix C). This suitability reflects the limited potential for ground-water contamination where natural precipitation is low and the depth to the water table is large.

5.5.2 Disinfection

Disinfection of wastewater is necessary prior to discharge to the Rio Grande. Continued chlorination is the only alternative considered in the facilities plan. Any other alternative would be more expensive, and would be considered only if chlorination caused significant problems. Such problems could reflect several adverse effects of chlorine use: possible production of carcinogenic by-products; chlorine residuals which can be toxic to aquatic life; the transport of a hazardous material through neighboring communities; and ineffectiveness in killing viruses and parasites.

These problems are not considered severe in Las Cruces, primarily because the wastewater is highly diluted by river water in summer, which is the time when the various water quality impacts could be most significant. Also, the amount of material subject to hazardous transport is relatively small. Nonetheless, continued use of chlorine for disinfection does involve some environmental risk which could be reduced through use of more expensive disinfection techniques.

5.5.3 Energy Conservation

Excessive energy use has been cited as a major problem with existing facilities, and thus of special concern to the evaluation of proposed facilities. The facilities plan engineer has detailed numerous specific measures to minimize energy consumption. The most important reflects the selection of anaerobic digestion for sludge stabilization; this process produces methane gas which can be used to generate electricity. The electricity can then be used to help operate the plant. Initial electrical production is expected to be from 1 to 1.5 million kilowatt hours per year, and 2.5 kilowatt hours per year at the design flow. This represents about 80 percent of the energy required to run the plant in the design year. Other measures are listed below (Molzen-Corbin, 1981b):

- Use of high efficiency electric motors for all applications
- Use of engine-generator jacket and exhaust heat to heat digesters
- Insulation of digesters to conserve heat
- Use of high intensity lighting only on demand for specific areas
- Specification of cross-linked roughing filter media to reduce recirculation requirements
- Use of air lift pumps where practical for liquid transfer
- Sectionalization of the aeration basin to allow use of the minimum basin volume required to meet discharge requirements; i.e., take full advantage of the roughing filter capabilities under all flow and temperature conditions
- Specification of shear/draft tube aerators so air requirements are based on oxygen transfer rather than mixing requirements and to reduce blower pressure requirements
- Use of deep aeration basins to maximize oxygen transfer
- Performance specification of aerators to assure a high oxygen transfer efficiency system.

Cost-effective solar heating and/or cooling of plant buildings also will be considered at the time of design, considering state-of-the-art equipment and experience. Upon completion of a new facility, energy costs (specifically, sludge transport and spreading) will slightly increase the expenses involved in operating the plant. But the new plant will be much more energy-efficient than the old, treating the current 4.6 mgd average flow for roughly the same operating outlay as the current plant, which can treat only 2.9 mgd. Operating expense details are presented in Table VII-4 of the Facilities Plan.

5.5.4 Odor Reduction

Odor, like energy use, was noted in Chapter 4 as being an existing problem. Table 5-13 lists: the location of odor sources from existing and proposed facilites; reasons for the odors; and measures proposed for mitigation.

TABLE 5-13. ODOR SOURCES AND MITIGATION METHODS.

Location	Reason for Odors	Mitigation Considerations
EXISTING SOURCES		
Influent Line	Septic sewage arriving at plant	Cover the wet well area and vent to odor control facilities.
Entrance Works	Septic sewage arriving at plant	To be replaced
Primary Clarifiers	Septic sewage arriving at plant	To be replaced
Aerobic Digesters	Inadequately disgested sludge	To be renovated - see below
Sludge Drying Beds	Inadequately digested sludge	To be used only as standby
NEW SOURCES		
Entrance Works	Septic sewage arriving at plant	Cover and vent to odor control facilities; aerated grit chamber; grit washer; covered rag container with provision for lime addition
Sludge Thickener	Exposed sludge	Cover thickener and vent to odor control facilities
Anaerobic Digesters	Leaking gases	Vent valve room to odor control facilities

Source: Molzen-Corbin, 1981b.

5.5.5 Water Conservation

Average per capita water use in Las Cruces increased 31 percent between 1970 and 1979, to 127 gallons per capita per day (gpcd). The increase reflects a rising standard of living plus increased visitor use. Further increased visitor use plus a higher proportion of newer homes is expected to result in an additional increase of 5 gpcd by 2005. EPA regulations require that per capita sewage contributions (and, by implication, water use) be held at current levels. To accomplish this objective, the facilities plan proposes that the City of Las Cruces 1) undertake a continuing water conservation publicity campaign, 2) pass an ordinance requiring water conserving fixtures for new construction, and 3) possibly raise water and/or sewer rates to keep the per capita sewage flow constant.

As noted in section 6.2.3, the City faces some difficulty in expanding its water system; also, new regulations of well drilling by the State will limit expansion of other water supplies. These problems provide additional incentives to conservation, and are likely to ensure that at least some measures are taken, irrespective of wastewater considerations.

5.5.6 Other Wastewater Sources

At several points during the planning process the question was raised as to how to deal with the potential proliferation of independent treatment plants in the Las Cruces area. Independent plants are most likely to be utilized if no capacity is available at the municipal plant, a condition which currently exists as far as treatment ability is concerned. This could result in new development being concentrated on large lots where individual on-site systems can be utilized, or in the use of package treatment plants for subdivisions. These plants would have to meet state ground water discharge requirements but would not be subject to EPA regulations. As additional capacity is provided at the treatment plant and the City's interceptor system is extended, the package plants could be retired. However, in the interim additional treatment plants could compound problems of odors and energy use.

5.5.7. Administrative Alternatives

Federal regulations for EPA-funded wastewater treatment projects require a sewer use ordinance prohibiting certain discharges and establishing the requirements for new sewers and connections, and a user charge system and schedule based on flows and wasteloads. These ordinances exist in Las Cruces, but are likely to need modification to accommodate the proposed facilities. Adjustment of connection charges and user fees is discussed below in Section 5.5.8. Similarly, municipal regulation of on-site systems was discussed in Section 5.5.1 and water conservation was addressed in Section 5.5.5.

Other administrative measures considered in the planning process include industrial cost recovery, industrial wastes, and operator training. All of these measures are discussed in some detail in the facilities plan, and are summarized here. Plant operating staff and industrial wastes (food processing) are two areas noted by EID as causing problems with the existing plant (EID, 1981). Additional staff, additional training, and the full-time availability of an experienced engineer are recommended for the proposed facility by the facilities plan. The need for strict enforcement of the City's industrial waste ordinance in relation to the chile processing industry was also cited by EID. An industrial pretreatment survey was conducted as part of the facilities plan; a grant for development of an industrial pretreatment program has been received and will be undertaken in the near future. An individual cost recovery program is no longer required by the federal government.

5.5.8 Project Funding

Table 5-14 projects the total and annual costs which Las Cruces must pay to build a new treatment plant, expand the collection system, operate the system, and accomplish other necessary wastewater management measures. The table shows that these costs range from $449,000 to over $3,573,000 per year, depending on the amount of the federal and state funds (if any) which are granted to support facility design and construction.

Table 5-14 also lists the monthly residential sewer use fees necessary to cover these costs, based on different levels of funding. Fees would be about $30 per month at one hundred percent local financing.

Reliance on sewer use fees is not the only way to retire local revenue bonds. Other methods are possible, such as a sales tax, increased connection fees, the use of stand-by charges, and the establishment of specific policies towards financing of interceptor extensions. There was a concern expressed in the public participation process that cost recovery methods be chosen that assign to those who benefit from new facilities a proportionate share of the costs of those facilities. There are also distributive benefits of new facilities, however; the alternatives listed below reflect, as a group, both of these classes of benefits.

1. Sales Tax. Cities in New Mexico may generate additional revenue by instituting a local sales tax of one quarter cent per dollar. Income from this source for Las Cruces is estimated at one million dollars per year. This income could be used for retirement of revenue bonds.

2. Connection Fees. The charge to hook up to the municipal collection system is about $100. Increases in this fee could shift the burden of a new treatment plant and interceptors directly to those who would benefit the most. Increasing the fee to $150 would produce about $800,000 per year, or 22 percent of the annual debt service. The City of Las Cruces is currently commissioning a detailed study of this funding alternative.

TABLE 5-14. SEWER USE FEES AS A FUNCTION OF LOCAL FUNDING.

Portion Funded by Local Revenue Bonds	Local and State Share	Annual Local Debt Service	Monthly Debt Service per Residence	Monthly O&M per Residence *	Average Total Monthly Residential Sewer Fee
12.5%	$ 4,005,000	$ 449,000	$ 2.40	$ 9.80	$ 12.20
25	7,989,000	895,000	4.75	9.80	14.55
50	15,958,000	1,788,000	9.50	9.80	19.30
75	23,926,000	2,681,000	14.20	9.80	24.00
100	31,895,000	3,573,000	18.95	9.80	28.75

* Share of maintenance cost by user class:

Residential - 71%
Industrial - 9%
Commercial - 8%
NMSU - 11%
Local government - 1%

Total annual operation and maintenance costs are $1,850,000.

Source: Molzen-Corbin, 1981b

3. Stand-by Charges. This option would tax vacant properties adjacent to or near a sewer line. This policy encourages infill of vacant land within the existing service area and thus delays or reduces the need for interceptors. As indicated in Section 6.6.2, all of the projected growth for Las Cruces could be accomodated by infill in the new service area.

4. Extension Policy. Many cities, including Las Cruces, require that developers pay for the extension of interceptors serving their developments. The financial impacts of this policy will depend on the timing and size of these developments and on the way this policy is actually written.

5. During the public participation process, a novel funding scheme was suggested, involving a trust that would build the sewage treatment works (possibly assuming the existing system as well), own the works, and lease them to the City of Las Cruces or to a sanitation district. The trust would be funded locally by citizens and sewer users, and its operating losses would be available to the citizens/users as income tax deductions (CAC, 1981). This option is offered here without the legal research required to establish it as a viable option.

5.6 APPLICANT'S PREFERRED ALTERNATIVE

The alternative recommended by the facilities plan engineer and the Citizens' Advisory Committee, and accepted by the Steering Committee of the joint powers, is as follows (see Appendix B for further information).

Treatment alternative 6, a roughing filter followed by abbreviated activated sludge; wet application of sludge at site with limited access	$21,788,000
Interceptor construction; lift station improvements; collection system renovations	$10,107,000
TOTAL COST	$31,895,000

Note that this cost is exclusive of the expense of constructing collection systems in areas of new development.

The preferred alternative is viewed by the Applicant as being: 1) the most adaptable in the face of changing federal regulations for effluent and sludge disposal; 2) the most flexible in terms of construction and operation especially for near-term solution of NPDES compliance problems; 3) comparatively inexpensive in total dollars (the preferred alternative is less than one percent more costly than the lowest cost alternative).

The complete plant, constructed adjacent to the existing plant, would be capable of treating 8.9 mgd of effluent in compliance with NPDES permit requirements. Effluent would be discharged to the Rio Grande as at present. Proposed interceptors would provide capacity for 40 years of development to the north and/or east; no additional capacity is proposed for areas south or west of Las Cruces. Sludge would be trucked to the west mesa and disposed of by injection on a controlled-access site.

PART B. ALTERNATIVES AVAILABLE TO EPA

EPA issued the NPDES permit that regulates the discharges from the Las Cruces plant. EPA is responsible for enforcing the permit; enforcement options include letters, administrative orders and referrals to the Department of Justice.

Region VI of EPA has several options with regard to the funding of the most cost-effective alternative (which may or may not be Las Cruces' preferred alternative).

1. EPA may decide to provide no funds for any Las Cruces project.
2. EPA may fund some percentage of the eligible portions of the project.
3. EPA may attach conditions to any grant awarded.

The City of Las Cruces has no alternative to implementation of most of its proposal, in order to achieve NPDES compliance and to support orderly development in the planning area. Thus, EPA's decision would not in itself be expected to change the major impacts of wastewater management actions. Rather, the presence of EPA funding (if any) would substantially reduce the financial burden placed on the residents in the area (see quantification in Table 5-14). Also, environmental considerations which are part of the EPA grant process (e.g. requirements for archeological surveys) could increase the prospects for effective mitigation of potential adverse effects.

PART C. ALTERNATIVES AVAILABLE TO OTHER AGENCIES

The EID has funding alternatives similar to those available to EPA, as well as options with respect to enforcement of state regulations. The agency has a mandated responsibility to monitor the water quality and ecology of the Rio Grande, including non-point sources.

CHAPTER 6

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

6. ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

Chapter 5 evaluated available alternatives on the basis of cost, reliability, environmental impact, and related factors, to arrive at a preferred alternative. Chapter 6 contains information in support of the selection process. Three types of information are provided: a description of the existing conditions; added details on the key issues discussed in chapter 5; and a summary of the beneficial and adverse impacts which could result from the Applicant's preferred alternative, and the other major alternatives. These summaries concern: proposed construction of interceptors and other improvements; the major wastewater treatment alternatives identified in Table 5-8; the major sludge management alternatives identified in Table 5-11; and those other alternatives which may have potentially significant impacts. Impact analyses are not provided for those alternatives which were eliminated during the screening process.

Chapter 6 contains eight sections, including seven which concern individual environmental components: earth resources (6.1), water resources (6.2), air and sound quality (6.3), biology (6.4), archaeology/ history (6.5), socio-economics and land use (6.6), and energy and other resources (6.7). Section 6.8 summarizes adverse impacts which cannot be avoided, the tradeoffs between short and long-term uses of the environment, and irreversible and irretrievable commitments of resources associated with the applicant's preferred action.

6.1 EARTH RESOURCES

Earth resources include terrain, climate, geology and soils.

6.1.1 Existing Conditions

Las Cruces is situated along New Mexico's lower Rio Grande Valley (Figure 6-1). The region contains three natural units, each of which has a typical terrain, geology, soils, and natural vegetation: mountains, valley, and intermountain basins (the latter has three sub-units, alluvial fans, alluvial bolsons, and volcanic terrain). Discussions of the environmental components are organized in terms of natural units where possible.

Terrain. The city extends eastward from the valley onto gently sloping alluvial fans originating from the nearby Organ Mountains. To the west is a broad tableland (mesa) accented with volcanic features. Within the city, terrain is gentle and comparatively featureless, with a predominantly man-made landscape including irrigation works, flood control structures and highways. Elevations range from 3,700 feet to 5,000 feet.

The planning area is divided between the valley natural unit on the west and the alluvial fan portion of the basin unit on the east (Figure 6-2). The physical line between the natural units is marked by a modest change in grade

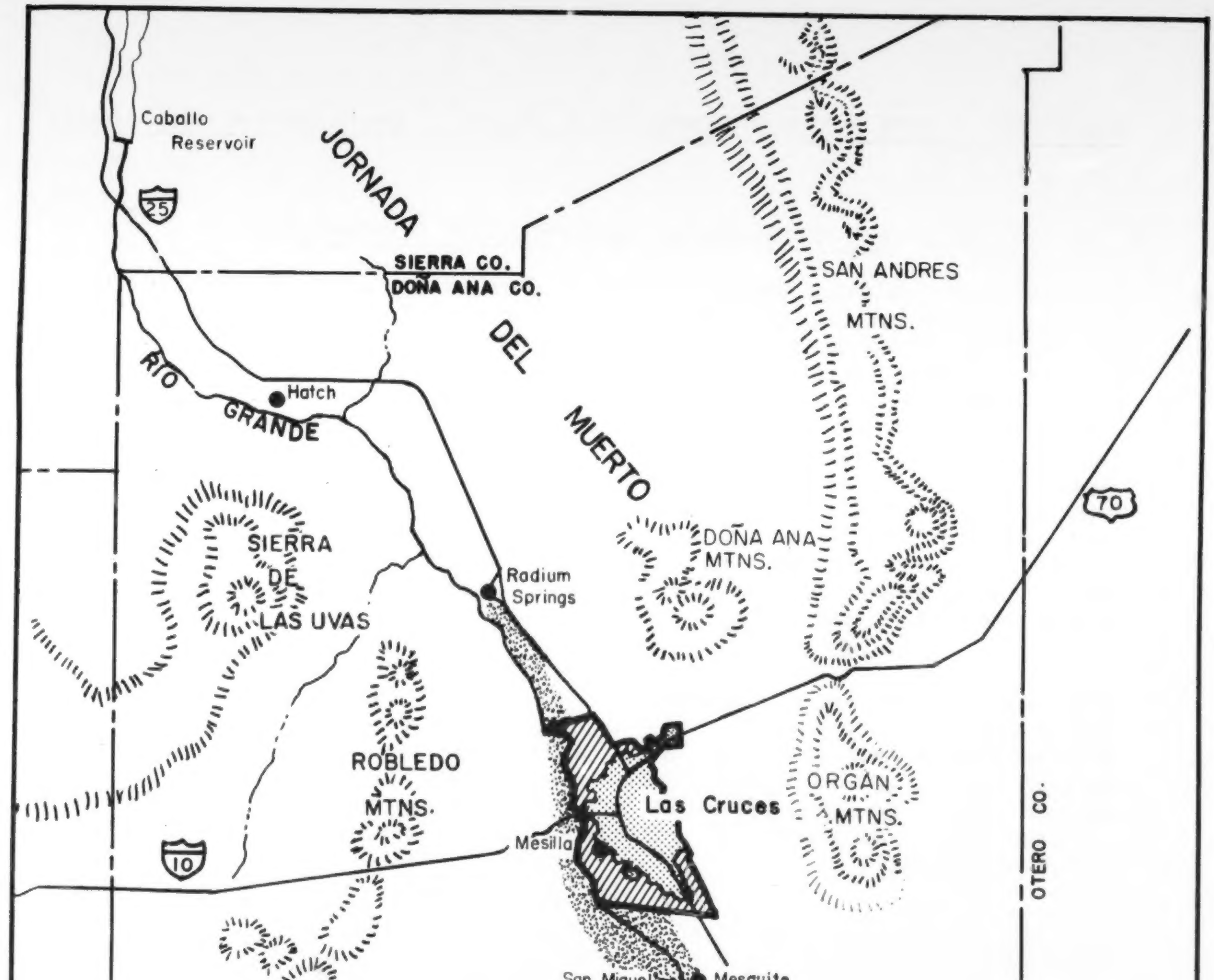

Caballo Reservoir
25
JORNADA
SIERRA CO.
DOÑA ANA CO.
DEL
MUERTO
SAN ANDRES MTNS.
RIO GRANDE
Hatch
70
SIERRA DE LAS UVAS
DOÑA ANA MTNS.
Radium Springs
ROBLEDO MTNS.
Las Cruces
ORGAN MTNS.
OTERO CO.
Mesilla
10
San Miguel
Mesquite
La Mesa
Vado
LUNA CO.
Kilboume Hole
MESILLA BOLSON
FRANKLIN MTNS.
Anthony
TEXAS
WEST POTRILLO MTNS.
EAST POTRILLO MTNS.
HUECO BOLSON
Canutillo
UNITED STATES
MEXICO
El Paso
Juarez
-LEGEND-
Mesilla Valley
City Limits
Planning Area
0 5 10
Scale
North

FIGURE 6-1. REGIONAL SETTING

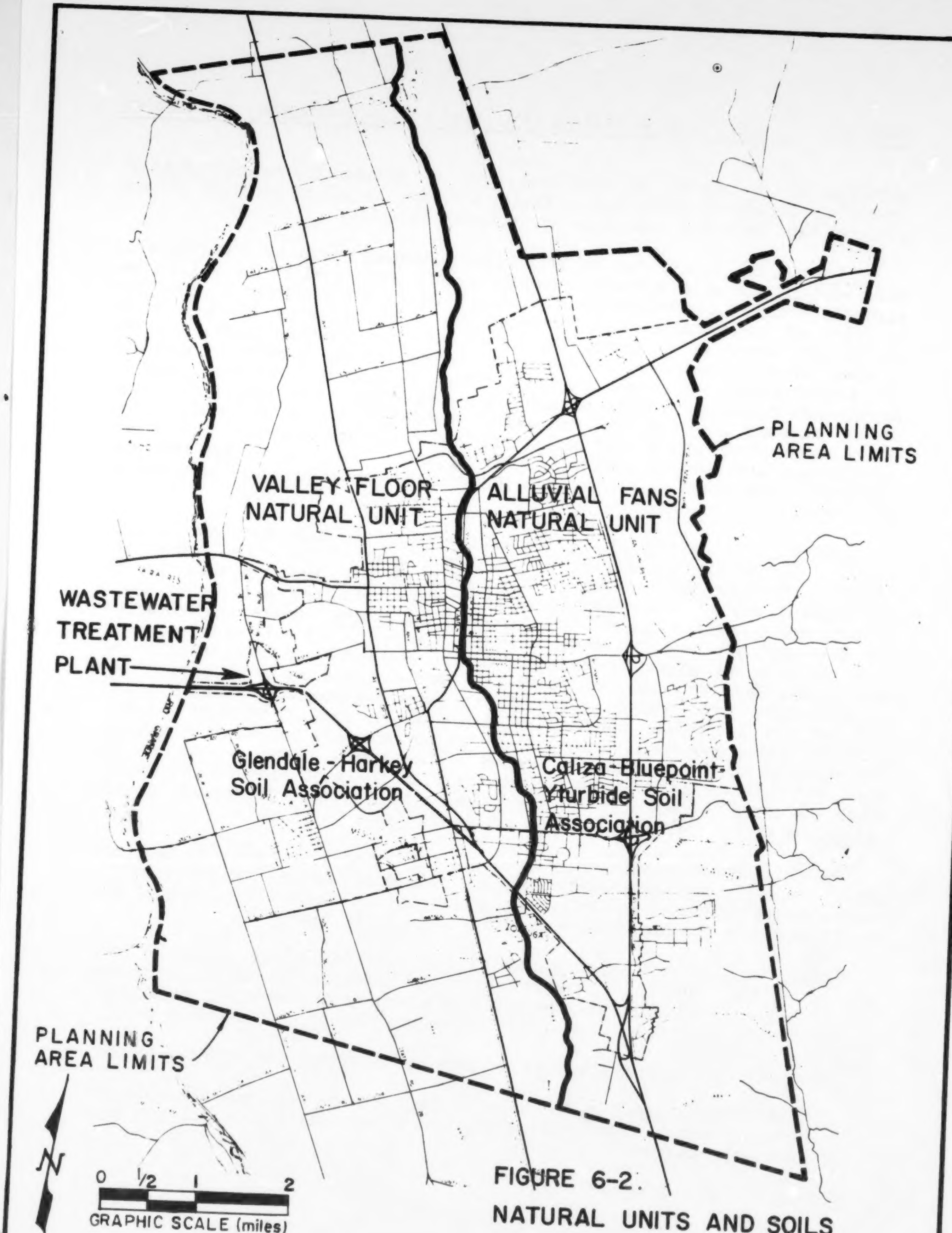

PLANNING AREA LIMITS
VALLEY FLOOR NATURAL UNIT
ALLUVIAL FANS NATURAL UNIT
WASTEWATER TREATMENT PLANT
Glendale - Harkey Soil Association
Caliza - Bluepoint - Yturbide Soil Association
PLANNING AREA LIMITS
N
0 1/2 1 2
GRAPHIC SCALE (miles)

FIGURE 6-2. NATURAL UNITS AND SOILS

within urban Las Cruces. In rural areas the line between the natural units is frequently marked by irrigation laterals, with the valley in cropland and the alluvial fans in native vegetation or irrigated by wells.

Climate. Las Cruces has an arid climate characterized by low rainfall, mild winters and warm summers. Average yearly precipitation is 7.7 inches with the greatest percentage occuring from July to early October in the form of brief but occasionally heavy thunderstorms. Pan evaporation averages 93.74 inches per year, or 16 times the amount of precipitation received. The growing season is generally six months or longer and the climate is suitable for a wide variety of crops, including cotton and pecans. The area normally experiences 80 percent of the possible daily sunshine. The general direction of air movement is from the southwest. Moderately strong to strong winds occur during late winter and early spring. Winds are greatest from March through May, when they are directly from the west. Summer winds are from the southeast. More detailed climate data for the Las Cruces area are provided in SCS (1980).

Geology. The geology of the Las Cruces region is well described in many reports, such as King et al., (1971), King and Hawley (1975) and Wilson et al. (1981). There are three major geologic units in the area, corresponding to the natural units. The mountain areas contain upfaulted and tilted sedimentary and igneous rocks of varied ages. The basins between the mountains are downfaulted structural depressions, partially filled with debris eroded from the adjacent uplands. These basin-fill sediments are considered to be part of the Santa Fe Group, a complex Late Cenozoic sequence of unconsolidated to moderately consolidated sediments with some interbedded volcanic rocks. Most of the basin-fill consists of irregular lenses of sediment (sands, gravels, silts, and clays) which can be traced laterally for short distances. The accumulation of sediment is several thousand feet thick in much of the area, but is only a few hundred feet thick at the east side of Las Cruces where the older bedrock lies relatively near the surface. In the Rio Grande Valley, up to 125 feet of alluvium overlies the Santa Fe Group.

Geologic resources within the planning area consist primarily of sand and gravel deposits and geothermal energy. Geologic hazards include possible moderate-size earthquakes (Sanford and Toppozada, 1974). However, none of the faults mapped in the area have been active in historic time.

Soils. Detailed soils information is available from a soil survey of Dona Ana County, (SCS, 1980). Soil associations are shown on the natural units map (Figure 6-2). Generalized data on soil characteristics - physical properties, limitations, and potential uses - have been summarized as part of Table 6-1.

Generally the soils of the planning area can be classified into two groups.

a) Coarse soils occur on the alluvial fans and are developed on sands and gravels eroded from nearby highlands. These soils commonly are deep and well-drained.

TABLE 6-1. SOILS OF THE NATURAL UNITS.

GENERAL SOIL DESCRIPTIONS	ENGINEERING CHARACTERISTICS	LIMITATIONS[1] AND SUITABILITIES
Valley Floor: Glendale-Harkey association: deep, moderately well drained to excessively drained loamy clay to very fine sandy loams. Very alkaline. Elevations range from 3,875 to 3,900ft. Formed from alluvial materials deposited by the Rio Grande. The major soil series components are listed below. a. Glendale (21%): deep, well drained medium and coarse textured soils which formed in mixed alluvium in slightly depressed areas on flood plains and low stream terraces. b. Harkey (19%): moderately fine textured, deep, well drained soils formed in mixed alluvium in flood plains and low stream terraces. c. Brazito (10%): dark finely textured, deep, well drained soils which formed on the banks of the Rio Grande near old or existing river channels. d. Others (50%): Adelino, Aqua, Anapra, Anthony, Armijo, Belen, Vinton, Riverwash.	Unified[2]: SM, SPML, CL Surface permeability[3]: moderate to slow, may be very slow, in some areas. AWHC[3]: very low to low Problems: shallow to very shallow water table; flood danger both locally and from river. High alkalinity; moderate to high corrosion danger for uncoated steel, very low for concrete; moderate shrink swell for Glendale soils.	Septic tanks: highly variable suitabilities due to variable soil types; generally moderately rapid permeabilities; normally suitable without major difficulties. Building site development: slight to moderate limitation due to low strength, shrink swell and cutbank caves. Utilities: moderate to severe limitations due to sloughing, corrosion, shallow water table. Recreation: suitable for recreation except in areas prone to excessive dust, sand or clay. Agriculture: very suitable except in areas of Brazito, Aqua, Anapra, and Riverwash soils which are limited by rapid percolation, sand or flooding. Community development: moderate but limited by problems with alkalinity, high water table, poor construction characteristics of soils. Wildlife habitat: suitable for rangeland and openland wildlife and their supporting vegetation. Construction materials: poor source of material.
Alluvial Fans: Caliza-Bluepoint-Yturbide association: deep somewhat excessively drained, gravelly loamy sand and loamy sand. Very alkaline and severely dissected. Elevations range from 3,900 to 4,200 ft. Formed from decomposed granitic alluvium on very deep, very old alluvial fans. a. Bluepoint (20%): deep, somewhat excessively drained loamy sand formed in alluvium modified by wind on fans, terraces and ridges along the upper margins of the Rio Grande Valley. The Bluepoint 1-5% slope variant accounts for nearly all of the soils presented in the Alluvial Fans portion of the planning area. b. Caliza (24%): pinkish grey to very pale brown gravelly sandy loam which formed on fans or river deposits of Pleistocene age along the upper margins of the Rio Grande Valley. c. Yturbide (19%): pinkish grey, loamy sandy, deep excessively drained soils that formed in alluvium along the sides and terminal fans of arroyos and old river deposits. d. Others (37%): dissected Haplargids, rock outcrops, Arizo, Canutio and Nickel soils.	Unified[2]: SM Surface permeability[3]: rapid AWAC[4]: low to moderately low Problems: rapid percolation rate; high wind erosion; highly alkaline; too sandy for most building uses.	Septic tanks: low to moderate limitations except in areas of potential flooding, or excessive slope. Building site development: rated severe due to unstable cutbanks and flooding. With proper preparation of these soils and the use of retaining walls, cutbank caving problems can be eliminated. The Las Cruces government dam east of Las Cruces eliminates the flooding problem for most of the planning area. Utilities: high risk of corrosion in areas of high Bluepoint concentration. Yturbide and Caliza are rated suitable, especially for concrete. Recreation: suitable except in areas prone to flooding or excessive sand, small stones and excessive slope as found in and near Arroyos. Agriculture: unsuitable due to rapid percolation rate, excessive sand and low organic content. Community development: very suitable Wildlife habitat: not suitable for wildlife habitat development. Construction materials: Caliza is good for gravel; Caliza and Yturbide fan for sand (excess fixes); Bluepoint generally poor except for roadfill.

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1. Limitations: slight, moderate, severe. Expressed in terms of difficulty (time, expense) in overcoming natural limitations of soils for specific uses.

2. Unified: a visual soil classification, based on texture and plasticity, used for embankment, foundation, and roadway construction.
SM: silty sands; SP: poorly graded sands; ML: silts of low plasticity; CL: clays of low plasticity.

3. Surface permeability classes and approximate rates (inches/hr): slow, 0.2-0.6; moderate, 0.6-2.0; rapid, 2.0-6.0; very rapid, over 6.0.

4. AWHC: abbreviation for available water holding capacity:

AWHC	Inches in 5 ft.
very low	less than - 3 3/4
low	3 3/4 - 5
moderate	5 - 7.5
high	greater than - 7.5

Source: SCS, 1980.

b) Highly variable soils occur on the valley floor; these include fine clays, loams, silts and sand developed from deposits laid down by the Rio Grande. Frequently the surface soil is underlain by a deep sand horizon; the water table commonly is within 5 to 15 feet of the ground surface, being highest during the irrigation season.

Soil interpretations regarding urban and agricultural land uses are useful inputs to wastewater management planning. The soils of the alluvial fan natural unit are the best suited for urban development in the area, and appropriately, most of urban Las Cruces is constructed on these soils. The valley natural unit is less suited to urbanization due to such factors as high water table and prime suitability for agriculture. The alluvial fans can be farmed if enough water and fertilizer are available to overcome the naturally rapid permeability and low organic content of the soil.

According to SCS (1980), soils in the Las Cruces area are highly variable in terms of suitability for use with septic tank drainfields. Soils in about half the area are rated by SCS as having severe limitations for use with septic tanks for a variety of reasons including percolation rates that are too fast or too slow, caliche, and high ground water levels. Despite these ratings, most percolation tests required by EID have indicated moderately rapid percolation rates in the planning area. There appear to be no major obstacles to use of septic tank and drainfields for liquid waste disposal on sufficiently large lots (one-third acre or larger; see Appendix A).

In the vicinity of the proposed sludge disposal site, soils are principally of the Cacique-Cruces association and the Wink-Pintura complex. The Cacique-Cruces soils are principally shallow loamy sands and sandy loams underlain by a moderately indurated caliche layer. The Wink-Pintura soils are loamy sands and sandy loams which may be as much as 60 in. deep and which do not have a well developed caliche layer.

6.1.2 Impacts of No Action Alternative

There are no impacts to terrain, climate, geology or soils under the no action alternative, except that this alternative would probably lead to more development on the (less suitable) valley soils; see section 6.6.3.

6.1.3 Impacts of Collection Alternatives

The collection system alternatives all lead to adverse short-term construction impacts. These impacts, and appropriate mitigation measures, are described in section 5.3.2. Erosion is generally a minor problem at most Las Cruces sewer construction sites because of gentle natural slopes. However, lines which lie in or cross an arroyo may be affected by storm runoff. The major risk would occur on arroyo banks that may be distrubed by construction equipment, either to lay the line itself or to gain access to the arroyo bed. Adverse impacts can be avoided by: 1) minimizing activities which disturb any arroyo bank; 2) stabilizing bank cuts through structural measures such as riprap or concrete sheet piling. The arroyo beds are almost certainly being filled in with sediment, since siltation normally results when headwater areas are cut off by a flood control dam; just such a dam was built in Las Cruces in 1975 (see Figure 6-4, section 6.2.1). Construction of sewer lines in the arroyos would not be expected to reverse this trend and cause accellerated erosion; rather the lines and manholes may get more deeply buried over time. Construction activities would not be expected to lead to any signigicant long-term alterations in the landscape, or to a change in the character of a natural drainageway. Refer to DWR (1972) and EPA (1973) for further information on erosion control planning; see also Table 5-6 for specific mitigation measures.

6.1.4 Impacts of Treatment Alternatives

Most treatment alternatives have minimal effects on earth resources, consisting of short-term construction impacts which would occur within the existing plant site. These impacts are described in 5.2.3 (see especially Table 5-5). Substantially greater impacts of the same type would result from those alternatives which involve either: a) a new plant site; or b) significant expansion of the existing site. Most such options were eliminated in the initial screening, but one of the remaining alternatives, aerated lagoons, would involve construction on 200 acres near the existing plant.

6.1.5 Impacts of Sludge Alternatives

The applicant's preferred alternative for sludge disposal calls for injecting wet sludge into the soil. A 104-acre site is recommended, allowing space for sludge injection, for disposal of cleanings from treatment units, and for a buffer zone and berm system around the site to prevent flooding and reduce wind erosion. A 40-acre area would be required for sludge injection itself at the design flow of 8.9 mgd (year 2005), with each acre receiving one sludge application per year. The proposed location of the 104-acres is on the mesa west of Las Cruces, near the airport (refer to Figure 5-4). Soils there are highly subject to wind erosion. Wilson (1975) reported on studies of wind erosion for cleared areas of Dona Ana County; actions such as vegetation removal and mechanical disturbance of the soil would increase the potential for such erosion. This prospect would be partly offset by the fact that sludge applications will increase soil moisture, lead to greater soil aggregation, and result in a rougher soil surface (which reduces wind efficiency. However, especially after the soil dries out each year, it is likely that some additional control measures (such as a windbreak) will be needed to minimize the erosion problem. Such measures can be developed during Step 2, or as needed after the site is established.

As discussed in section 5.4, sludge is a good soil conditioner and has some fertilizer value. Therefore wet-sludge injection should have a positive impact on the soil, such as improving its texture, water-retention, and ion-exchange properties. However, there is some possibility that heavy metals (especially cadmium) from the sludge might build up to levels that are toxic either to plants or to the higher food chain. For this reason, EPA regulations require that the disposal area not be used in the future for growing food-chain crops. Heavy metal content in sludge varies according to the industries discharging to the treatment plant. Since Las Cruces has little industry, heavy metal buildup may not be a problem, and depending on regulatory policies, the fertility of the site may be put to beneficial use at some future time. Alternately, the sludge/soil mixture can be mined and used as a soil conditioner (on city parks, or through sale to the public).

All the other sludge management alternatives call for disposal of the sludge at the City landfill. About 0.5 acre/year of land would be needed at design capacity. Unavoidable, long-term impacts to earth resources are those associated with normal landfill operation.

6.1.6 Impacts of Other Alternatives

For the most part, actions taken with respect to on-site systems, disinfection, energy conservation, odor control, water conservation, other wastewater sources, administration, and funding have no impacts on earth resources. Those impacts which do occur (e.g. adverse effects from construction of various facilities) are the same for all alternatives described in section 5.5.

6.1.7 Impacts of EPA Alternatives

The major impacts on earth resources are adverse, short-term effects resulting from construction of interceptors, improvements at the treatment plant, and use of a sludge application site. These effects are an unavoidable result of the actions which Las Cruces must take if it is to correct existing treatment deficiencies, and provide for orderly urban development. EPA alternatives do no alter these impacts, except that the normal funding process provides an added level of review which helps ensure that mitigation measures such as listed in Table 5-6 are incorporated into construction contracts.

6.2 WATER RESOURCES

Surface and ground water are both important resources in the Las Cruces region. The discussion of hydrologic conditions is divided into three parts. Sections 6.1.1 and 6.2.2 discuss the quantity, quality and present use of the area's surface and ground water supplies respectively. Section 6.2.3 summarizes water management and use, with an emphasis on future conditions.

6.2.1 Existing Conditions, Surface Water

Supply and Use. The history and economy of Las Cruces is tied to its location along one of the West's major rivers, the Rio Grande. Figure 6-1 shows the reach of the Rio Grande between Caballo Dam, New Mexico and El Paso, Texas. The following summary of hydrology and use of the Rio Grande in the Las Cruces area is based primarily on Lansford et al. (1973) and WPRS (1980).

Though no domestic use of surface water occurs, the river is the major water source for irrigation. The management of Rio Grande water is complex, reflecting an international treaty with Mexico, an interstate compact between Colorado, New Mexico and Texas, and numerous contracts between water suppliers and water users. The basic principal is that surface water is shared among New Mexico, Texas and Mexico. In New Mexico all surface flows are contracted to the Elephant Butte Irrigation District (EBID), which contains 90,640 acres of land with primary water rights.

Flows are strictly regulated by storage in Caballo Reservoir (Figure 6-1), and Elephant Butte Reservoir further upstream. Irrigation releases are made in March-September and supply farms in the Rincon, Mesilla and El Paso-Juarez Valleys. The Leasburg Dam diverts river flow into the Leasburg Canal at the head of the Mesilla Valley. Farms in the lower Mesilla Valley are supplied by the East Side and West Side Canals which are fed by the Mesilla Diversion Dam southwest of Las Cruces (Figure 3-1).

Table 6-2 provides data regarding the availability of Rio Grande water over time. During the period 1920-1950 the water supply was generally adequate. Subsequent to 1950 there has been a significant shortage of surface water in the area, with considerable variability in supply from year to year.

TABLE 6-2. CHANGES IN SURFACE WATER AVAILABILITY IN THE LAS CRUCES REGION.

Four representative measures of availability have been selected: AFY = acre-feet per year; AFY/A = acre-feet per year per acre. EBID = Elephant Butte Irrigation District.

Period	Average Release from Caballo Reservoir in AFY d/	Average discharge, Rio Grande at El Paso in AFY	Average allotment of water to farms in EBID in AFY/A	Average delivery of water to Mexico (per 1906 Treaty) AFY
1941-1950 a/	882,240	620,780	3.0 b/	62,307
1951-1960	473,890	231,500	1.94	35,068
1961-1970	536,880	273,930	2.19	43,072
1971-1980 c/	527,910	286,700	2.21	43,941

a. Conditions prior to 1940 were similar to 1941 - 1950.
b. Assumed to be 3.0 AFY/A or larger, since supply was rated "adequate".
c. Delivery to Mexico is for 1971-1977.
d. Excludes water diverted by Bonita Ditch just below dam.

Source: Water and Power Resources Service, 1981.

Since 1951, an allotment procedure has been used whereby the available water is divided on a proportional basis among the users in New Mexico, Texas and Mexico. In years of full supply the EBID allotment is about 3 acre-feet per acre, which is approximately the irrigation requirement (farm delivery) for valley crops. However, since 1951 the allotment has averaged only about 2.1 acre-feet per acre. Thus, the water available typically has been about two-thirds of the amount needed to supply lands with primary water rights.

Causes of the decline in surface-water availability are not known with certainty, but are believed to include climatic conditions (increased aridity) and land use changes (increased water consumption upstream). Most projections indicate insufficient surface-water supplies may be a permanent condition in the Las Cruces area. An important consequence of surface-water shortages has been an increased reliance on supplemental ground water for agricultural purposes, as discussed subsequently.

Lansford et al. (1973) and WPRS (1980) provide information about what happens to the water diverted by EBID. The following estimate is based on these references and is suitable for general planning purposes only (AFY/A = acre-feet per year per acre).

Water diverted at canal headgates	about	5	AFY/A	(100%)
These diversions are divided into:				
Canal seepage and waste	about	2.75	AFY/A	(55%)
Farm delivery	about	2.25	AFY/A	(45%)
Farm deliveries are in turn divided into:				
Farm percolation and return flow	about	0.90	AFY/A	(18%)
Farm use (consumed by crops)	about	1.35	AFY/A	(27%)

The remaining need for farm water, about 1 AFY/A, is met by ground water pumping; of the ground water diversions about 60% is consumed, and 40% percolates back to the ground water and becomes part of the return flow.

This tabulation indicates that nearly three-quarters of the diversions are not consumed by crops. Most of this 'unused' water seeps or percolates into the ground water where it is either pumped as part of the supplemental irrigation supplies of the District, or it is collected by an intricate system of drains and returned to the Rio Grande where it can be rediverted downstream. Canal wastes reach the drains and/or river directly, adding to the large volume of return flow from EBID. There is some 'beneficial loss' of water due primarily to evaporation and transpiration from open water and vegetation in and near the river, canals and drains.

At present Las Cruces discharges all of its treated wastewater to the Rio Grande. The discharge occurs near the treatment plant, five miles above Mesilla Dam. During the irrigation season, the discharge is diluted by river flows which typically are about 500 cubic-feet per second, or about 100x as large as the wastewater flow. About two-thirds of the river/effluent mixture is diverted by Mesilla Dam into canals which serve farms in the lower Mesilla Valley. The rest passes over the dam and flows downstream where it is augmented by return flows from irrigated lands and is discharged to the El

Paso-Juarez Valley. Portions of the canal and river flows are lost to evaporation and substantial amounts may seep into the valley alluvium where they become part of the areas' ground-water supply.

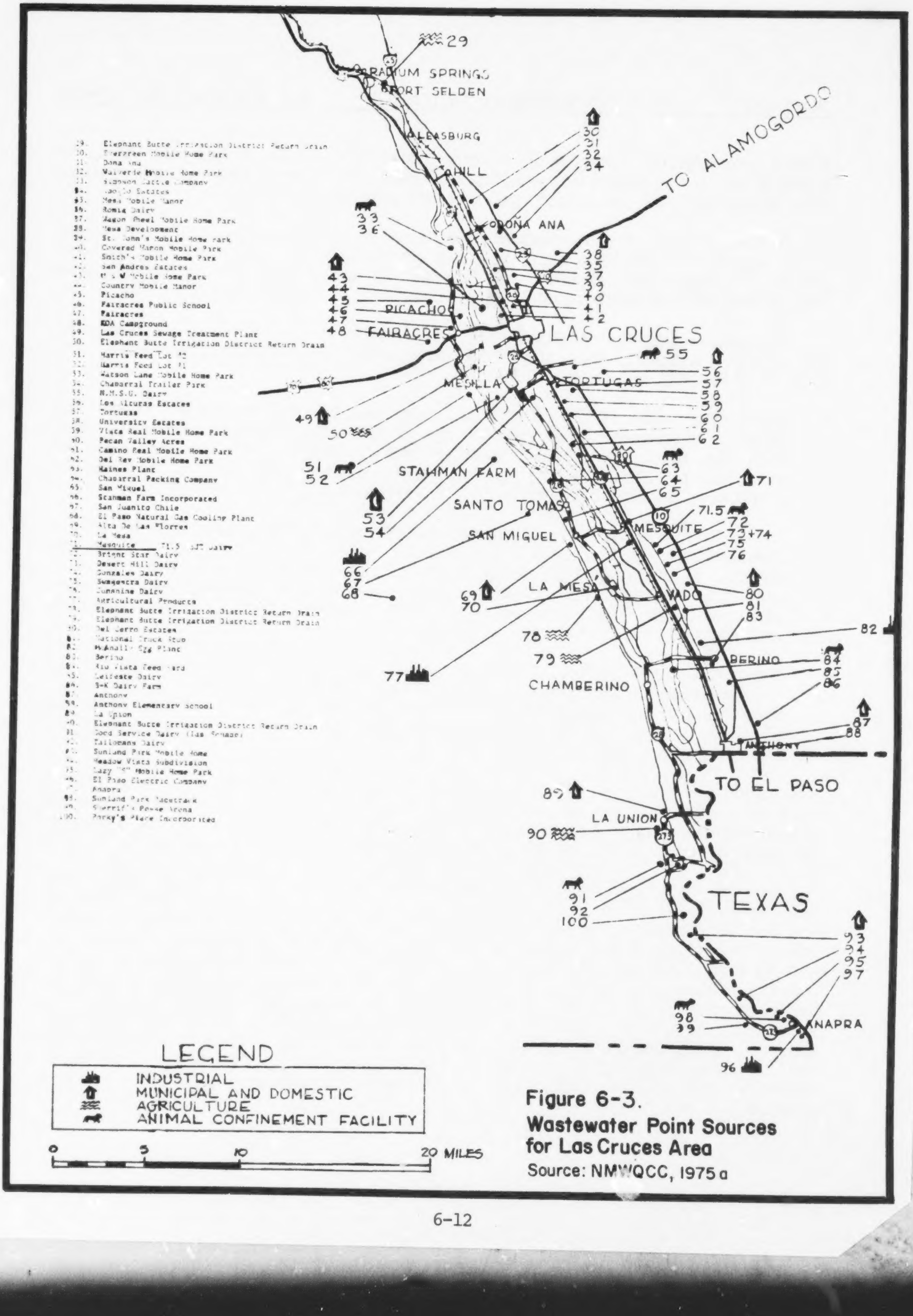
During winter, the wastewater discharge is to a nearly dry river. The water normally seeps into the river bed within several miles of the treatment plant, although small amounts may flow as far as El Paso during periods when the stream carries storm runoff or large amounts of return flow.

At present Las Cruces discharges about 5,100 AFY of treated wastewater to the river. Assuming that the above discussion is reasonably accurate, the fate of this effluent is as follows.

> Two-fifths (40%) of the discharge occurs outside the irrigation season and thus is discharged to a nearly dry river. The effluent probably seeps into the river bed between Mesilla and El Paso. This seepage would be expected to recharge the ground water of the Mesilla Valley and to eventually be pumped by wells in the valley.
>
> Two-fifths (40%) of the discharge occurs in the irrigation season and is diverted at Mesilla Dam. The treated water makes up about 1% of the 200,000 to 250,000 AFY diverted by Mesilla Dam in a typical year. It must meet the various fates tabulated above (e.g. 27% consumed and the rest returned to the system as seepage, waste or percolation). A small portion would be subject to 'beneficial' loss.
>
> One-fifth (20%) of the discharge occurs in the irrigation season but is not diverted at Mesilla Dam. It is part of the river flow which passes over the dam and which flows to Texas and Mexico. Most of this flow is used for irrigation purposes although some is diverted by the City of El Paso for municipal use.

The major conclusions of this analysis are that the Las Cruces effluent follows a relatively complex flow path involving exchanges from surface to ground water and back again; and that ultimately virtually all of the effluent is put to beneficial use on the farms of New Mexico, Texas or Mexico.

Surface Water Quality. The New Mexico Water Quality Control Commission has prepared two planning documents relating to water quality management in the facility planning area. The Lower Rio Grande Basin Plan (NMWQCC, 1975a) identifies three major concerns for water quality management: levels of pathogenic bacteria, salinity and sediment. All of the principal water quality problems identified are potentially affected by non-point as well as point sources of pollution. Point sources of water pollution in the planning area are shown on Figure 6-3. Non-point pollution occurs from sediment sources, irrigated farmland drainage and septic tank effluent. Basic water quality management tools proposed in the Basin Plan are stream standards (most recently revised in June, 1981), effluent regulations and point source permits.


29
RADIUM SPRINGS
FORT SELDEN
LEASBURG
HILL
DOÑA ANA
TO ALAMOGORDO
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PICACHO
FAIRACRES
LAS CRUCES
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62
MESILLA
TORTUGAS
49
50
51
52
STAHMAN FARM
63
64
65
71
71.5
SANTO TOMAS
53
54
SAN MIGUEL
MESQUITE
72
73+74
75
76
66
67
68
69
70
LA MESA
VADO
80
81
83
82
78
79
77
BERINO
84
85
86
CHAMBERINO
87
88
ANTHONY
TO EL PASO
89
LA UNION
90
91
92
100
TEXAS
93
94
95
97
98
99
ANAPRA
96
LEGEND
INDUSTRIAL
MUNICIPAL AND DOMESTIC
AGRICULTURE
ANIMAL CONFINEMENT FACILITY
0
5
10
20 MILES

29. Elephant Butte Irrigation District Return Drain
30. Evergreen Mobile Home Park
31. Dona Ana
32. Valverde Mobile Home Park
33. Simpson Cattle Company
34. Apollo Estates
35. Mesa Mobile Manor
36. Romig Dairy
37. Wagon Wheel Mobile Home Park
38. Mesa Development
39. St. John's Mobile Home Park
40. Covered Wagon Mobile Park
41. Smith's Mobile Home Park
42. San Andres Estates
43. M & W Mobile Home Park
44. Country Mobile Manor
45. Picacho
46. Fairacres Public School
47. Fairacres
48. KOA Campground
49. Las Cruces Sewage Treatment Plant
50. Elephant Butte Irrigation District Return Drain
51. Harris Feed Lot #2
52. Harris Feed Lot #1
53. Watson Lane Mobile Home Park
54. Chaparral Trailer Park
55. N.M.S.U. Dairy
56. Los Alturas Estates
57. Tortugas
58. University Estates
59. Vista Real Mobile Home Park
60. Pecan Valley Acres
61. Camino Real Mobile Home Park
62. Del Rey Mobile Home Park
63. Haines Plant
64. Chaparral Packing Company
65. San Miguel
66. Stahmann Farm Incorporated
67. San Juanito Chile
68. El Paso Natural Gas Cooling Plant
69. Alta De Las Flores
70. La Mesa
71. Mesquite 71.5 SJT Dairy
72. Bright Star Dairy
73. Desert Hill Dairy
74. Gonzales Dairy
75. Swagerty Dairy
76. Sunshine Dairy
77. Agricultural Products
78. Elephant Butte Irrigation District Return Drain
79. Elephant Butte Irrigation District Return Drain
80. Del Cerro Estates
81. National Truck Stop
82. McAnally Egg Plant
83. Berino
84. Rio Vista Feed Yard
85. Leifeste Dairy
86. B-K Dairy Farm
87. Anthony
88. Anthony Elementary School
89. La Union
90. Elephant Butte Irrigation District Return Drain
91. Good Service Dairy (Las Sombras)
92. Tallomans Dairy
93. Sunland Park Mobile Home
94. Meadow Vista Subdivision
95. Lazy "S" Mobile Home Park
96. El Paso Electric Company
97. Anapra
98. Sunland Park Racetrack
99. Sherriff's Posse Arena
100. Porky's Place Incorporated

Figure 6-3.
Wastewater Point Sources for Las Cruces Area
Source: NMWQCC, 1975a

The second plan was prepared under Section 208 of the Federal Clean Water Act and is concerned primarily with regional wastewater management and non-point sources of water pollution (NMWQCC, 1979). The stream segment of the Rio Grande affected by the proposed action is classified as "effluent limited", which means that water quality is meeting and will continue to meet applicable water quality standards, or that water quality will meet standards after application of secondary treatment standards for municipalities and best practicable standards for other discharges. No wasteload allocations for this stream segment are listed in the plan.

New Mexico water-quality standards for the Las Cruces area are intended to protect the Rio Grande for irrigation, limited warm water fishery, secondary contact recreation, and livestock and wildlife watering. Specific standards which have been set to protect these uses include temperature, pH, dissolved oxygen, total dissolved solids (TDS), fecal coliform bacteria, chloride, and sulfate. Additional narrative standards protect water against degradation and gross forms of contamination. Table 6-3 lists the numerical stream standards which apply to the Rio Grande in the Mesilla Valley. Texas stream standards are also provided in the Table. A comparison of New Mexico and Texas standards indicates that water which meets standards in New Mexico will also meet standards in Texas, with the possible exception of total dissolved solids.

Water quality of the Rio Grande near Las Cruces has been evaluated in studies such as Hernandez (1976) and EID (1978a). The USGS and EID have collected quality data for a number of stations along the Rio Grande and for drains and canals in the area. The most extensive records exist for the Rio Grande below Elephant Butte dam, and at the Vinton Bridge near Anthony. Sampling at these stations has been frequent and includes a large number of parameters.

Table 6-3 summarizes some representative data for two stations above and two stations below Las Cruces. Data for other parameters and for other stations can be found in Lee Wilson and Associates (1981). Table 6-3 shows that the concentration of most constituents increases from upstream to downstream, but that values are generally within stream standards. A more thorough summary discussion of river quality is provided in Table 6-4.

Several conclusions can be drawn from available data and published studies. River water tends to be naturally hard, alkaline and slightly saline. The single most evident human influence on water quality is that of irrigation. The salts present in the diverted irrigation supply are concentrated in the smaller volume of return flow which therefore is slightly saline. Thus, the quality of drain flows is generally worse than canal flows, and concentrations of nearly all parameters increase going downstream. Periods when river flows are low (that is, mostly from the drains) have poorer quality water than during high flow periods. Salinity in return flows is an inevitable result of irrigation and is not considered pollution under New Mexico law. However, the salt build-up does adversely affect water users downstream.

TABLE 6-3. WATER QUALITY DATA AND STANDARDS: THE RIO GRANDE NEAR LAS CRUCES, NEW MEXICO

Where two values are given, first is the average, second (in parentheses) is the extreme (maximum unless otherwise noted).

	STANDARDS		QUALITY OF RIO GRANDE			
	New Mexico Stream Standards a/	Texas Stream Standards b/	Below Elephant Butte Dam c/	At Leasburg Dam c/	At Mesilla Dam c/	Vinton Bridge near Anthony c/
Water temperature degrees centigrade	34	35	15 (28)	21 (26)	15 (30)	22 (28)
pH d/	6.6-8.8	7.0-9.0	8.0 (9.1)	8.2 (8.7)	8.3 (8.5)	8.2 (8.5)
Dissolved oxygen e/ milligrams/liter	5.0	5.0	8.3 (1.0)	7.8 (6.4)	7.0 (5.7)	8.4 (6.7)
Fecal coliform bacteria number/100 milliliters	1000 f/	1000	14 (77)	92 (778)	153 (866)	908 (2900)
Total dissolved solids milligrams/liter	2000	1800	315 (474)	-	672 (763)	850 (1330)
Chloride milligrams/liter	400	500	23 (43)	-	71 (99)	140 (580)
Sulfate milligrams/liter	500	700	94 (150)	-	187 (226)	281 (700)
Total Kjeldahl nitrogen milligrams/liter	-	-	0.54 (2.4)	-	-	0.91 (2.00)
Turbidity Jackson units	-	-	15.7 (300)	-	65 (100)	77 (350)
Conductivity umhos/cm at 25°	-	-	733 (1220)	809 (1720)	777 (920)	1327 (3700)
Total organic carbon milligrams/liter	-	-	6.8 (11.0)	-	12.2 (27.2)	5.6 (11.0)
Total phosphorus milligrams/liter	-	-	0.09 (0.86)	-	-	0.32 (0.96)

Sources:

a. Standards from NMWQCC (1981), section 2-101. Rio Grande from the International Boundary and Water Commission sampling station above American Dam at El Paso upstream to one mile below Percha Dam. Standards apply only when the river flow is above 350 cfs.

b. Standards from WTCOG (1977). Segment 2308, Riverside Diversion Dam to New Mexico State line.

c. Below Elephant Butte Dam: USGS station; STORET no. 08361000; 7/75 - 8/80.
At Leasburg Dam: USGS station; STORET no. 08363500; 4/75 - 5/79.
At Mesilla Dam: NMEID station; STORET no. LRG047; 3/73 - 7/78.
Vinton Bridge near Anthony: USGS station; STORET no. 08363840; 7/75 - 6/78.

d. Values in parentheses is the maximum reported. No values below 7.0 are reported for these stations.

e. Values in parentheses for dissolved oxygen are the minimum values reported. The standard for DO is the minimum acceptable value.

f. The monthly geometric mean is not to exceed this level. No more than 10% of the samples may exceed 2000 coliforms per 100 ml.

TABLE 6-4. SUMMARY OF WATER QUALITY INFORMATION.

The following discussion highlights what is known about changes in the quality of water in the Rio Grande as the river passes through the Las Cruces area. See also Table 6-3.

Solids. High levels of dissolved solids mean that water is comparatively salty; this may adversely affect some irrigated crops, and it can produce undesirable taste and laxative effects in drinking water. Releases from Elephant Butte Reservoir are comparatively low in dissolved solids, but extensive irrigation use gradually concentrates salts (see Table 6-3) and the water becomes slightly saline by the time it reaches Fort Quitman. Studies show that from Caballo Dam to El Paso, total dissolved solids concentration increases 50 to 70%: most of this increase is due to consumptive use of the water, for the increase in pounds of salt is only about 5%. TDS levels just below Elephant Butte Dam are around 315 mg/l. By Fort Quitman the average is 3815 mg/l, a twelve-fold increase. The salinity is most marked when river flow is dominated by return flows and sewage late in the irrigation season. The dissolved solids are dominantly sodium salts (chloride and sulfate). From upstream to downstream, calcium, magnesium, bicarbonate and sulfate tend to be replaced by sodium and chloride (Wilcox, 1962). The water is considered to be very hard. With continued irrigation above Las Cruces, and increased population in the Rio Grande basin, salinity will increase in the future. For example, growth in Albuquerque, New Mexico, is projected to increase discharge-weighted dissolved solids concentrations at Las Cruces by 20 percent (EPA, 1977a, page D-45) in the year 2000.

The levels of suspended solids (sediment) are also high in the Rio Grande, and the stream is always very turbid, although less so than before the construction of Elephant Butte Reservoir. Frequent maintenance of irrigation structures is required to remove silt, and the water must be treated prior to any municipal use.

Bacteria. Fecal coliform bacteria are widely used as an indicator of the presence of disease-causing organisms (pathogens). Available data indicate that fecal coliform levels increase in the Rio Grande from upstream to downstream. Coliform levels much higher than those given in Table 6-3 are reported in the water diverted by the City of El Paso water treatment plant where the geometric mean coliform count in 31 samples taken in 1977 and 1978 was 11,740 per 100 milliliters and the maximum was 380,000. These values are in line with measurements reported in the literature. The data suggest at least two important sources for the bacteria: sewage plant discharges and runoff from urban and agricultural areas. Information on other pathogens, such as viruses, is generally insufficient to evaluate existing or potential problems.

Dissolved oxygen. Organic pollution and low concentrations of dissolved oxygen are typically associated with sewage discharges and also with storm runoff. The organics consume oxygen in the process of being broken down; if excessive organic pollution occurs, oxygen in the water can be depleted, to the point that sensitive aquatic forms are unable to survive (e.g. fish kills).

Total organic carbon (TOC) is an indication of organic pollution. Table 6-3 shows that TOC levels at Mesilla Dam are higher than at stations above Las Cruces: this may be due to sewage and storm discharges from Las Cruces. In tandem with this, dissolved oxygen levels are somewhat lower at Mesilla than at upstream stations. However, no dissolved oxygen value below the stream standard is recorded.

Nutrients. The Rio Grande is relatively rich in nutrients such as nitrogen and phosphorus, although conditions vary widely from time to time. There are no lakes in the reach above Fort Quitman, so that nutrient enrichment is not a problem. On the contrary, the nutrients are probably used as fertilizer by irrigators downstream. The 1978 EID survey indicated that nutrient levels are elevated immediately below the Las Cruces wastewater discharge point, but that the excess is quickly assimilated and levels fall back by Mesilla Dam.

Toxic substances. Substances potentially toxic to humans, wildlife or crops include metals and pesticides. Data on natural river water are extremely limited, but do not demonstrate any particular problems. One survey in the Las Cruces area revealed that only mercury was found in levels which exceed the recommended limit to protect aquatic life (EID, 1978a). Possible sources of the mercury were not discussed and no remedial actions were recommended. One elevated zinc measurement was also reported. Limits for arsenic, cadmium, chromium and lead were not exceeded. Data do indicate comparatively high levels of lead in the region, especially in irrigation canals and drains downstream of Las Cruces where some lead measurements exceed the drinking water standard. Urban air pollution has been suggested as one source of the contamination.

Occasional high levels of boron have been observed in the river, at concentrations which may adversely affect sensitive crops. Pesticide sampling has been very limited; a sample of the mud at Vinton Bridge, taken in 1976, found no measureable amounts of lindane, DDD, DDE, DDT, dieldrin, heptachlor, nor methoxychlor.

Sources: Wilcox, 1962; EPA, 1977a, WTCOG, 1977; EID, 1978a; NMWQCC, 1981.

The bacteria standard is the only pollution indicator that has been frequently violated in the area. However, the problem has been less severe since Las Cruces began chlorinating their sewage effluent in 1973. Runoff from urban and farm lands is also a major factor contributing to bacterial contamination (EPA, 1975a). High levels of mercury were observed in one river sampling study and one high reading for zinc was reported; the source of these metals is not known and is not believed related to City effluent. Discharge of treated sewage does cause an increase in the amount of solids and nutrients in the river, but there are no data indicating that standards have been violated. Biological sampling indicates that the Rio Grande in the Las Cruces area is a moderately polluted stream; however, adverse effects of the treatment plant discharge are limited, while the benefits of the water itself are substantial (see section 6.4.1).

Flood Hazards. Las Cruces participates in the National Flood Insurance Program. A Flood Insurance Rate Study has been conducted by the Corps of Engineers; a final map of flood rate insurance zones will be released in early 1982 (Rodriguez, 1981). Flood hazards in Las Cruces occur along the Rio Grande and in and near arroyos which drain the mountains and alluvial fans.

Flooding from the Rio Grande is controlled by Elephant Butte and Caballo Reservoirs north of Las Cruces (refer to Figure 6-1), and by riverside levees. Persistent flooding of arroyos entering Las Cruces from the east has been controlled for a standard project flood (having the probability of occurring once in 1,000 years) by the Las Cruces Flood Control Dam, an earthfill structure constructed in 1975 by the U.S. Army Corps of Engineers. Controlled release of floodwater from the dam is through the Las Cruces Outlet Channel, formerly Alameda Arroyo, which discharges into the Mesilla Drain or directly into the river (see Figure 6-4). Elsewhere, minor flooding of arroyos is still possible from local runoff in those areas shown on Figure 6-4.

Neither the wastewater treatment plant nor any lift stations are within flood hazard areas identified in Figure 6-4. In the past local flooding in the valley and runoff from the alluvial fans entered sewer manholes. These problems are being corrected by extension of storm sewers and reconstruction of manholes.

6.2.2 Existing Conditions, Ground Water

The ground water resources of the region are discussed in many published or open-file technical reports such as Conover (1954), Leggat et al. (1962), King et al. (1971), Meyer and Gordon (1972), Richardson et al. (1972), Lansford et al. (1973), Gates et al. (1978), WPRS (1980), and Wilson et al., (1981). Figure 6-5 is a cross-section drawn east to west through the Las Cruces area; it illustrates the location and relationships of the major aquifers (water-bearing rocks and sediments) in the region. The location of the section is shown by line A-A' on Figure 6-6.

Supply and Use. The alluvium and basin fill sediments of the Las Cruces area serve as reservoirs for a large supply of good quality ground water.

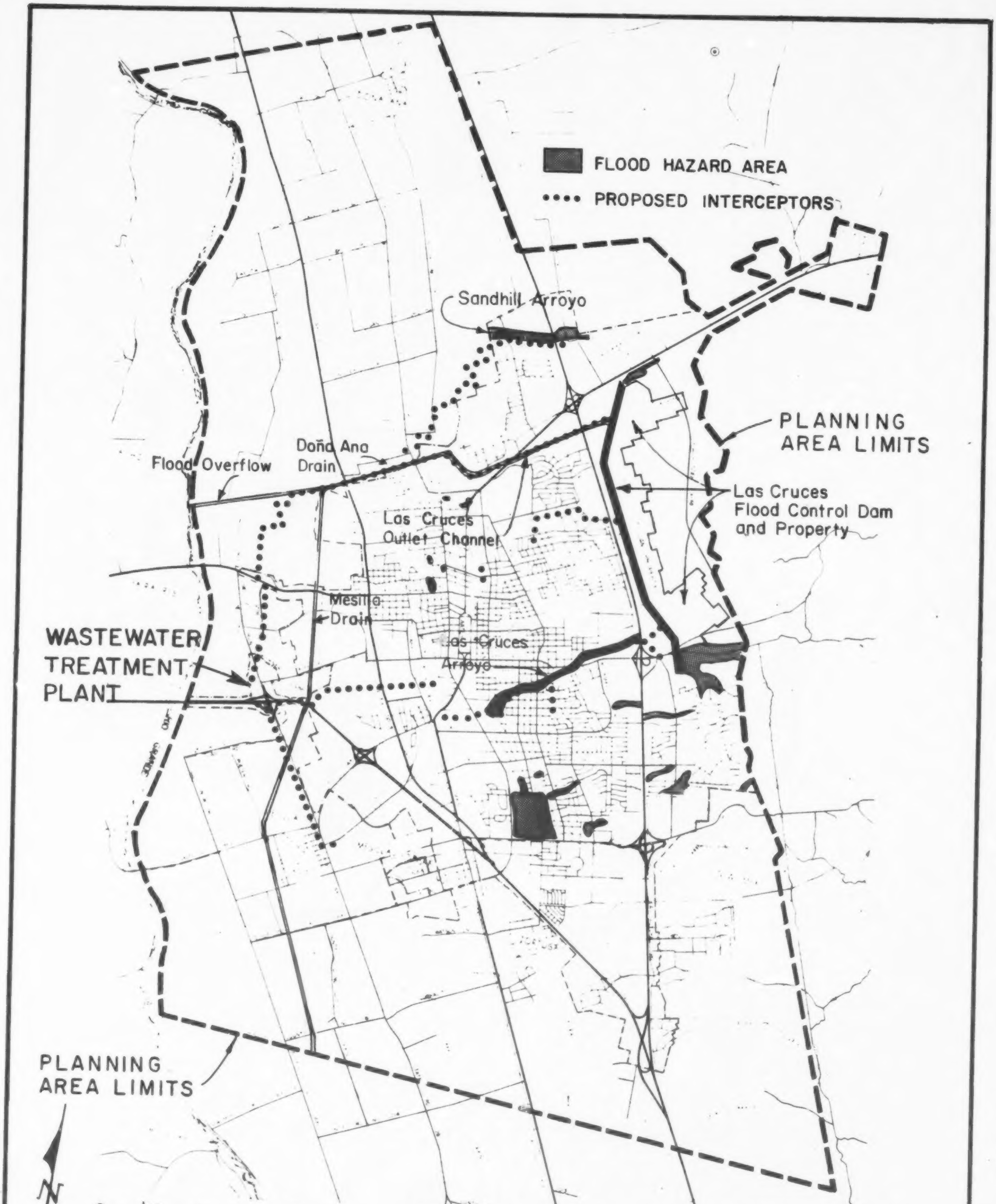

▬ FLOOD HAZARD AREA
•••• PROPOSED INTERCEPTORS
Sandhill Arroyo
PLANNING AREA LIMITS
Doña Ana Drain
Flood Overflow
Las Cruces Outlet Channel
Las Cruces Flood Control Dam and Property
Mesilla Drain
WASTEWATER TREATMENT PLANT
Las Cruces Arroyo
PLANNING AREA LIMITS
N
0 1/2 1 2
GRAPHIC SCALE (miles)

FIGURE 6-4. FLOOD CONTROL AND FLOOD HAZARD AREAS

Source: FIA, 1977

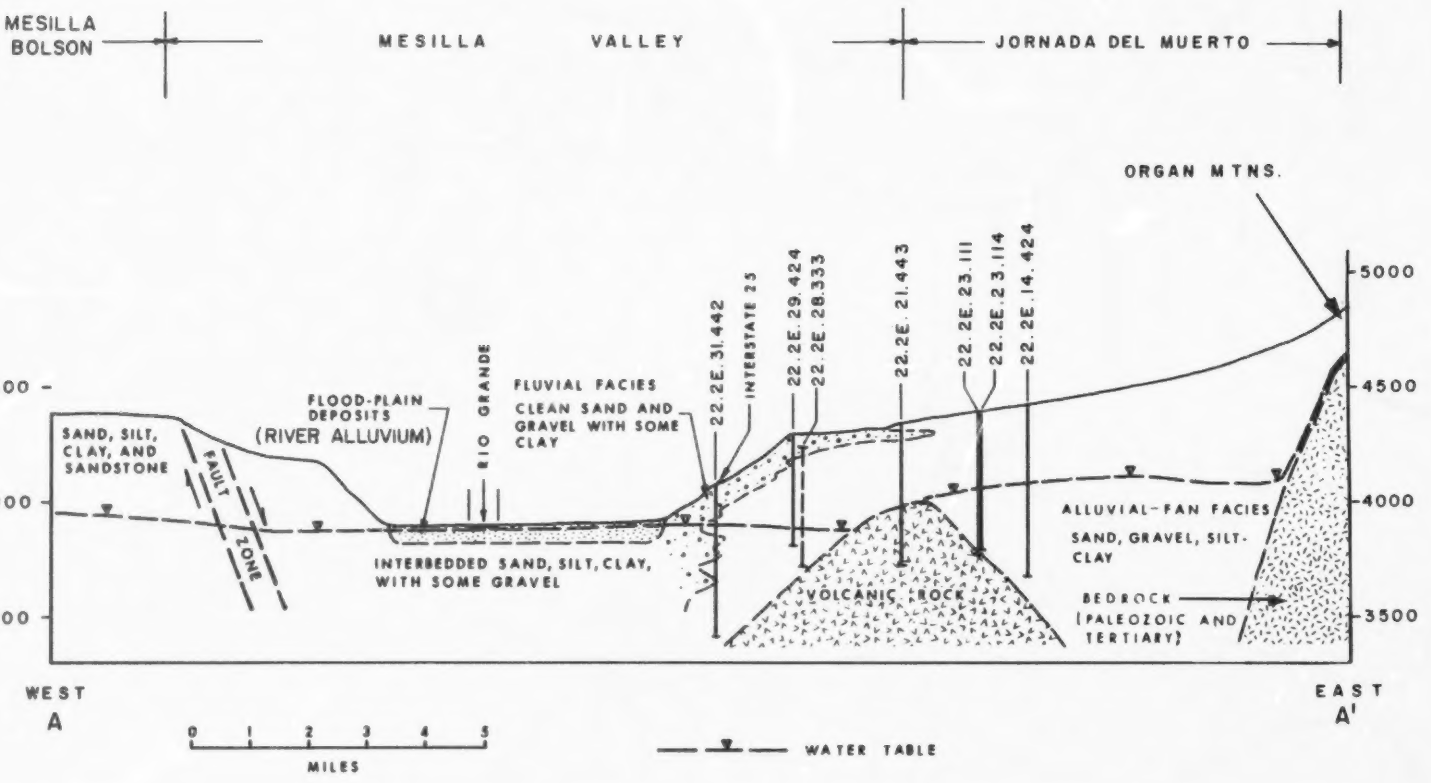
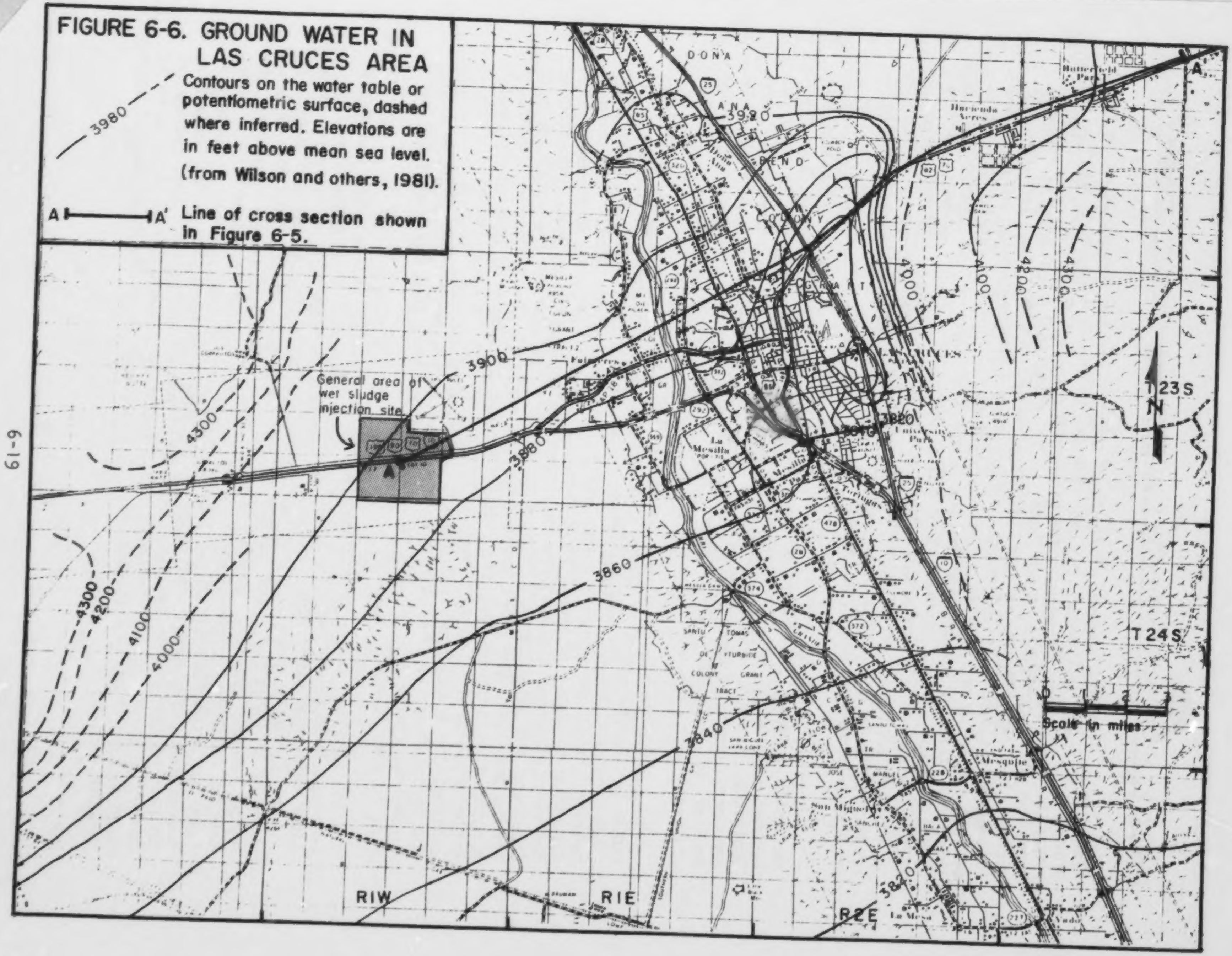

MESILLA BOLSON
MESILLA VALLEY
JORNADA DEL MUERTO
ORGAN MTNS.
4500
4000
3500
5000
4500
4000
3500
SAND, SILT, CLAY, AND SANDSTONE
FAULT ZONE
FLOOD-PLAIN DEPOSITS (RIVER ALLUVIUM)
RIO GRANDE
FLUVIAL FACIES CLEAN SAND AND GRAVEL WITH SOME CLAY
INTERBEDDED SAND, SILT, CLAY, WITH SOME GRAVEL
22.2E.31.442
INTERSTATE 25
22.2E.29.424
22.2E.28.333
22.2E.21.443
22.2E.23.111
22.2E.23.114
22.2E.14.424
VOLCANIC ROCK
ALLUVIAL-FAN FACIES
SAND, GRAVEL, SILT-CLAY
BEDROCK (PALEOZOIC AND TERTIARY)
WEST
A
EAST
A'
0
1
2
3
4
5
MILES
WATER TABLE

FIGURE 6-5. HYDROLOGIC CROSS SECTION NEAR HIGHWAY 70

(after King and others, 1971)

FIGURE 6-6. GROUND WATER IN LAS CRUCES AREA


3980
A
A'
3920
3900
3880
3860
3840
3820
4000
4100
4200
4300
General area of wet sludge injection site
DONA ANA
BEND
La Mesilla
Mesquite
T23S
N
T24S
0
1
2
3
Scale in miles
RIW
RIE
R2E

Contours on the water table or potentiometric surface, dashed where inferred. Elevations are in feet above mean sea level. (from Wilson and others, 1981).

A——A' Line of cross section shown in Figure 6-5.

There are three major sources of fresh or slightly saline ground water in the region. 1) East and North of Las Cruces is the Jornada del Muerto, an elongated trough filled with sediments containing an estimated 5.3 million acre-feet of recoverable fresh water. 2) River alluvium occurs directly beneath the Mesilla Valley and contains about 2.7 million acre-feet of recoverable, slightly saline water. Large amounts of pumping can be sustained by this aquifer because it is rapidly replenished by surface water. 3) Underlying the river alluvium, and to the south and west of Las Cruces is the Mesilla Bolson, which contains basin-fill deposits storing an estimated 54 million acre-feet of recoverable fresh water in New Mexico. Of this amount, 20 million acre-feet is beneath the Mesilla Valley. The principal resources of importance to Las Cruces occur in the second and third aquifers, which will be discussed in more detail below.

The alluvium of the Mesilla Valley contains mixed coarse and fine-textured sediments ranging in thickness from less than 50 to more than 120 feet, typically being no more than 80 feet. Water from this aquifer is used for individual domestic wells and for irrigation. Thick beds of coarse gravel and sand occur near the base of this unit, grading upward into sand and clay. The aquifer is hydraulically connected to both the river and the underlying/adjacent basin fill.

Figure 6-6 is a map of water levels in the Las Cruces vicinity. The water table is usually within 5 to 15 feet of the land surface. During the irrigation season the water table rises by 1 or 2 feet in response to river seepage, canal seepage and percolation from irrigated lands. The general direction of water movement is downvalley (south), with local movement from the river and canals toward the many open drains which have been excavated to intercept the water table. These drains limit the rise of the water table in summer and lower the water table over the winter. Despite large volumes of pumping from this aquifer there has been no long-term decline of the water table anywhere in the New Mexico portion of the Mesilla Valley. This is conclusive evidence that the pumping is balanced by large amounts of seepage and percolation. In fact the supplies of surface water to the alluvium are so large that there is a net downward movement of water into the underlying basin fill in some locations.

The Mesilla Bolson underlies the Mesilla Valley and extends many miles westward beneath the mesas of southern New Mexico. The Bolson contains a large thickness (3000 feet or more) of sediments (sands, clays, gravels) known as the Santa Fe Group. These sediments are highly variable and generally permeable. Overall as much as 60% of the thickness consists of water-bearing sands and some gravels. Beneath the valley, the aquifer may be separated into several horizons by clay lenses. The City of Las Cruces water supply comes from two production fields in this aquifer, one directly beneath the valley alluvium and one on the east edge of the city beneath alluvial fan sediments. On this eastern edge, the aquifer is much thinner and perhaps less permeable. Also, in the middle of the well field there is a near-surface occurrence of hard volcanic rock which acts as a barrier to the movement of ground water (Figure 6-5).

In the mesa area (left side of Figure 6-5), fine sediments may be more common than beneath the valley; this is especially likely toward the south (toward Anapra). The water table occurs at 300 to 400 feet beneath the mesa surface and slopes toward the valley (with a southerly component); small amounts of upland recharge move along the gradient and eventually discharge to the Rio Grande. Unlike the valley area there is no evidence that clay lenses might affect the flow of water.

In general, wells perforated in either the alluvial or basin-fill aquifer have good to excellent yields, ranging from 1,000 to 3,000 gallons of water per minute. Parameters relevent to technical studies are included here for the benefit of specialists who may be interested. Specific capacities are usually high, often ranging from 20 to 100 gallons per minute per foot of drawdown; coefficients of transmissivity commonly range from 75,000 to 150,000 gallons per day per foot, although they are less than 50,000 gpd/ft in most of the City wells; and the coefficient of storage is in the range of 0.15 to 0.25.

The ground-water resources of the Lower Rio Grande Region are used (1) to supplement the surface waters for agricultural use, (2) as the municipal supply for towns within the region, (3) as an industrial water supply, and (4) for rural domestic use. Within the Elephant Butte Irrigation District, the pumpage of ground water varies annually and seasonally with the amount of surface water available. Approximately 90 percent of the land in the District receives supplemental ground water. Outside of the Elephant Butte Irrigation District, approximately 8,500 acres are irrigated solely from ground-water sources. Nearly 1000 irrigation wells utilize the valley alluvium and the shallow basin-fill aquifer during periods of surface-water shortages. Most are between 90 and 200 feet deep; the average yield is 1,500 gpm.

Ground water provides all municipal and industrial water supplies. Wells are generally deeper than irrigation wells and take most of their water from the basin fill. City wells are located toward the east along Interstate 25, range in depth from 360 to 751 feet, and produce water from the Santa Fe Group deposits in the Mesilla Bolson. Depth to water ranged from 79 to 239 feet in 1974; yields vary from 300 to over 1,250 gpm. The best yields are obtained at the southeast end of the field. Pumping from the City wells has caused a local cone of depression in the water table, which is reflected by a local water-level decline averaging about 1.5 feet per year overall, and 3 ft/year near the sub-surface barrier shown on Figure 6-5 (King and Hawley, 1975). Despite the local drawdown, there is no areawide decline of the water table in the area, indicating a balance between withdrawals and recharge.

Ground Water Quality. In the Mesilla Valley the salt build-up in irrigation return flows has produced a zone of slightly saline water from the water table to depths ranging from less than 100 feet to more than 250 feet. Drains were constructed in the Mesilla Valley more than 50 years ago to convey most of the salts out of the soil and to the river. However, the high rate of seepage/percolation into the valley alluvium coupled with withdrawal of ground water from deeper parts of the aquifer allows some of the poor quality water to move downward rather than toward drains.

Dissolved solids content of ground water in the Mesilla Valley ranges from less than 300 to more than 3,000 mg/l. The best quality water occurs in zones of seepage, near the river and canals. The poorest water is beneath irrigated fields. The average content of dissolved solids in the shallow water is 1000+ mg/l TDS (Total Dissolved Solids) north of Las Cruces and 2,000+ mg/l TDS to the south. Changes in ground water quality with time are not apparent. For example, in 11 City wells sampled in 1965 and again in 1974 or 1975 there was an average increase in TDS of 20 mg/l; in four of the wells the salinity level decreased (WPRS, 1980). However, for the region as a whole the potential exists for increased salinity as the amount of pumping increases.

The uppermost portion of the Santa Fe Group beneath the Mesilla Valley is adversely affected by the downward moving salinity described above. Elsewhere in the Mesilla Bolson water quality is generally good with dissolved solids of less than 1,000 mg/l. City wells penetrate beneath the saline zone (or are located outside the Mesilla Valley) and thus obtain good quality water which averages about 530 mg/l TDS. Some City and domestic wells drilled along a fault line east and south of Las Cruces have produced warm to hot water associated with a geothermal source.

In 1977 the New Mexico Environmental Improvement Division (EID) studied the impact of on-site systems on ground-water quality in the Las Cruces area. Water samples were taken at the San Andreas Estates (northeast edge of City) and in Mesquite, to the south. While several samples were found to exceed drinking water standards for nitrate, they were either on the 'upstream' side of the possible sewage source or were random in terms of location and magnitude. EID concluded that the nitrates could be from fertilizers applied to cotton and other crops (Hendrickson, 1980).

EID data indicate iron and manganese are present in shallow ground water in the Dona Ana village area. These contaminants are of aesthetic concern only, and are typical of rural valleys with a shallow water table and either farming activity or on-site systems use. Where iron and manganese occur, nitrates are usually absent, which may explain why the latter pollutant was not identified as a widespread problem in the 1977 survey. EID has not discovered any health problems related to the local degradation of shallow ground water by on-site wastewater systems. The spread of community water systems in the last five years will undoubtedly reduce the number of persons dependent on shallow wells for drinking water, so that if instances of sewage-related health problems did occur they would be limited to specific homes which have both an inadequate disposal system and a poorly built shallow well.

6.2.3 Present and Future Water Use and Management

Table 6-5 summarizes current and probable future water use in the area, based on studies performed by the New Mexico State Engineer. The table shows clearly that irrigation has been and will remain the dominant water user of the region. However this use will decline slightly, to about 90% of the total

TABLE 6-5. PRESENT AND FUTURE WATER USE IN DONA ANA COUNTY.

All values in thousands of acre-feet per year. Withdrawn water is the water diverted from a canal or well. Depleted water is that which is consumed; the remaining withdrawn water is returned back to the surface or ground water system (for example via a wastewater discharge).

Type of Use	Source of Water	1970 Withdrawn	1970 Depleted	2005 a/ Withdrawn	2005 a/ Depleted
Irrigation	Note b	440	201	391	193
Las Cruces	Ground Water	10	5	29	17
Other c/	90% Ground Water	10	4	13	9
TOTAL d/		460	210	433	219

Source: County Profile (ISC, 1975a). The values given are representative; every reference gives somewhat different values for each water use.

a. Assumed same as year 2000 water requirements stated in Table 25 of ISC, 1975a; this reflects that population projections used in the EIS show somewhat less growth then the cited table.
b. Based on Water and Power Resources Service (1980), 25% of irrigation withdrawals are from ground water; 40% of irrigation consumption is ground water.
c. Includes rural, manufacturing, minerals, power, stock, fish and wildlife, and recreation uses.
d. Excludes Tularosa and Jornada Basins, which presently account for less than 1% of water use in the County.

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water demand by 2005. Las Cruces is the largest municipal user of water in southern New Mexico (see also section 6.6.1) and, next to irrigation, the largest user of ground water. Several smaller water systems serve outlying areas, and throughout the County individually owned wells are used for domestic supplies.

Table 6-5 projects future water needs for the area. The projection for Las Cruces assumes a continued increase in per person water use, which may not occur should demand be stabilized as the result of higher water rates and/or water conservation programs. It also reflects a more rapid population growth than has been used in developing the facilities plan. Alternative estimates of the urban water demand in the year 2005 can be made by assuming that, as now, wastewater flows will represent half the water demand. In that case, the predicted wastewater flow of 8.9 mgd would be associated with a water use of 17.8 mgd of water in 2005, or nearly 20,000 acre-feet per year.

The City can physically obtain the needed water through expansion of its well field, especially if deep wells are drilled in the Valley area. However, there are complex factors of water rights management which will effect the development of the additional water supplies. These factors have a profound influence on decisions made regarding wastewater recycling, and thus are discussed here in some detail.

Under the rules of the New Mexico State Engineer, the Rio Grande is considered to be fully appropriated; no new uses of the water are allowed.

Until 1980, there were no controls on ground-water pumping. However, in 1980 the State Engineer declared the existence of a Lower Rio Grande Underground Basin which encompasses all of the Mesilla Valley and most of the Mesilla Bolson. Existing ground-water uses in this area will be allowed to continue. However, new diversions probably will be managed according to the principal that the ground and surface-water supplies of the area are interconnected. Pumping of a given amount of ground water may eventually result in an equivalent decrease in surface flow, with the decrease occurring in a matter of a few months or years for shallow valley wells. This means that any increased pumping of ground water may be allowed only if an equivalent amount of surface-water use (or historic ground-water use) is abandoned. The exact method of offset is subject to several considerations. For example, in municipal water use the City is normally given credit for returning wastewater to the river system; this can offset 50 percent (or more) of the pumping effects. Individual domestic wells are exempt from these regulations, while wells to supplement existing water rights are generally allowed without any offset requirement.

Based on the pumping capacity of its existing wells, Las Cruces has 17,040 AFY of water rights. This estimate assumes that the City continues to discharge all of its wastewater back to the Rio Grande, and that the wastewater amounts to about 50 percent of the water pumped. Should the City reduce its wastewater discharge, it would have to replace this supply by obtaining other water rights.

The predicted water need in 2005 is on the order of 20,000 AFY, or about 3,000 AFY more than allowed under the existing water rights. Assuming that the City continues to get a 50% credit for its wastewater discharge, this indicates that 3,000 AFY of water rights need to be obtained by that time. Since farmlands typically have about 3 acre-feet of rights per acre, this indicates that the City will need to obtain and retire 1,000 acres of irrigation water rights by the year 2005.

A major complication in the water rights picture is that the City of El Paso has: a) sued the State of New Mexico in an effort to strike down laws which embargo the export of ground water from the state; and b) filed applications to appropriate 246,000 acre-feet per year of water from the Lower Rio Grande Basin. These efforts have been strenuously opposed by the State of New Mexico, as well as Las Cruces, EBID, and others. As yet, the litigation has not been resolved and there is controversy about how the El Paso action will affect the future availability of water and water rights in the region.

A final aspect of future water use is that the growth of the urban area has the possibility of encroaching on aquifer recharge areas, which essentially includes the entire valley floor shown in Figure 6-2. SRGCOG (1980) recommends that aquifers and drainageways be protected, and left in as natural a condition as possible.

6.2.4 Impacts of No Action Alternative

The No Action Alternative would fail to solve the water-quality problems associated with the existing wastewater discharge. As indicated in section 6.2.1 (see especially Tables 6-3 and 6-4), these problems relate to odors, floating debris, bacteria, and dissolved oxygen. Moreover, this approach would probably lead to a substantial increase in development in rural areas, using on-site systems and package plants which would increase the pollutant load discharged to ground water.

6.2.5 Impacts of Collection Alternatives

Sewer construction in the valley may require dewatering in order to prevent water from standing in excavated trenches. Dewatering generally involves installation of wells near the trench, and pumping to lower the water table. The pumped water is discharged to an irrigation drain or storm sewer. Two types of short-term, adverse impacts result. First, shallow domestic wells near the trench may experience a drop in water levels; in extreme cases the wells may dry up for a short period, and it is possible that pumps could incur permanent damage. Second, the pumped water is normally taken from the upper portion of the shallow valley aquifer. It may contain high amounts of iron and manganese or other dissolved solids, and may also have a slight odor. If the trench is near a cesspool or saturated drainfield, excess bacteria may be found in the water. Finally, the pumping process can result in the water being turbid, with an excessive silt load.

To avoid the adverse impact of water table lowering, it will be necessary to evaluate the extent of water table decline near a trench and to identify all wells along a construction route which may be affected. Well owners will then be advised of the problem, and instructed to utilize pumps on a manual basis only. If a serious water level decline is observed, the contractor will be required to provide an alternate supply until the water table recovers.

The discharge from trench dewatering normally requires permission from the EBID if a drain or canal is used, or from the City, if a storm sewer is used. Problems of sediment quality are managed by utilizing sand-point wells which are relatively protected against the influx of silt. Where appropriate, the outfall from dewatering can be designed to control erosion by minimizing discharge velocity and turbulence. Other water quality aspects of the discharge water are not normally regulated, since the ground water would naturally flow to irrigation drains and the river. Dewatering also requires permission from the State Engineer, but because the pumping is of a short-term nature, no water rights need to be obtained.

Construction in a flood hazard zone will occur in the case of interceptor 230, which will be installed within Las Cruces Arroyo. Figure 6-7 locates the route of the line with respect to flood hazard areas mapped by the Federal Insurance Administration. A notice concerning this flood plain construction has been prepared as part of this EIS in accordance with EPA procedures for

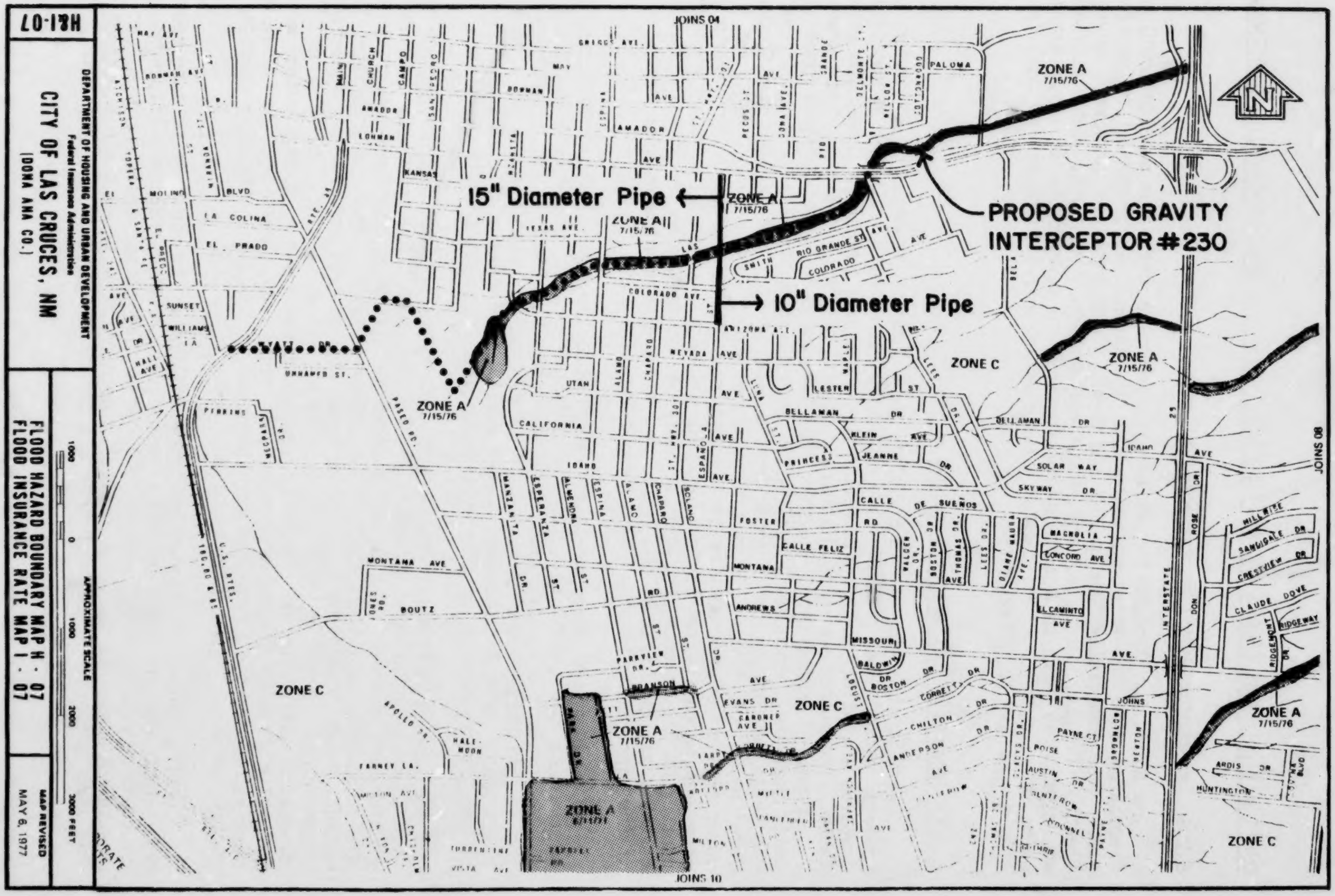
PROPOSED GRAVITY INTERCEPTOR #230
15" Diameter Pipe
10" Diameter Pipe
ZONE A 7/15/76
ZONE C
JOINS 04
JOINS 08
JOINS 10
N
H&I-07
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
CITY OF LAS CRUCES, NM
(DONA ANA CO.)
APPROXIMATE SCALE
1000 0 1000 2000 3000 FEET
FLOOD HAZARD BOUNDARY MAP H - 07
FLOOD INSURANCE RATE MAP I - 07
MAP REVISED
MAY 6, 1977

FIGURE 6-7. ROUTE OF PROPOSED LAS CRUCES ARROYO INTERCEPTOR
Source: FIA, 1977

▨ FLOOD HAZARD AREA

implementation of NEPA (40 CFR, Part 6C, Subsection 6.302(b). This notice will be presented at the EIS Public Hearing, and is circulated with this EIS as the last entry in Appendix C. The principal impact of construction in a flood plain is the potential for erosion, as discussed in section 6.1.3

The Las Cruces arroyo heads at the base of the Las Cruces Flood Control Dam, which has cut off the arroyo from its former headwaters. The active drainage area of the arroyo is limited to developed urban neighborhoods near the drainageway. The arroyo ends just east of El Paseo Avenue in a large artificial ponding area. The arroyo is up to 100 feet wide with steeply sloping to vertical banks in some areas; in other locations the channel has been partially filled in.

The proposed interceptor is 10-15 inches in diameter, and can be placed in a trench which is only about 5-6 feet deep and 3-4 feet wide. Coupled with appropriate mitigation measures (see especially Table 6-6 and discussion in section 6.1.3), this should minimize adverse, short-term construction impacts. The interceptor will be fitted with sealed, locking manholes flush with the ground surface, in order to avoid an obstruction to flood waters and to minimize aesthetic impacts. A utility corridor has been left across the park in anticipation of the interceptor, so that no major disruption of the recreational facilities would be expected.

6.2.6 Impacts of Treatment Alternatives

All seven of the treatment alternatives would have two beneficial, long-term impacts on the Rio Grande: 1) the volume of wastewater effluent discharged to the river would increase by nearly two fold over the next 25 years; 2) the quality of the effluent would improve substantially, reducing existing water-quality impacts.

The increased volume of effluent discharge will meet the same fate described in section 6.2.1: 40% will seep into the river bed in winter; 40% will be diverted at Mesilla Dam during the irrigation season; 20% will be diverted in Texas or Mexico during the irrigation season. The treated water will make up about 2% of irrigation diversions at Mesilla Dam. Virtually all of the discharge would be put to beneficial use, either directly from irrigation diversions, or indirectly through pumping of seepage water. The continued discharge would provide Las Cruces with a water right credit to offset the fact that the pumping of city wells reduces river flows over time.

The improved quality of the effluent should result in better water quality as measured at Mesilla Dam (see Tables 6-3 and 6-4). In particular, dissolved oxygen would be expected to increase and bacteria levels to decrease; odors and floating debris should become insignificant. However, because of natural and non-point sources, the river would remain relatively saline and turbid, but suitable for its designated uses.

Refer to section 6.6.4 for a discussion of how the alternatives impact irrigation water rights. As discussed in section 5.3.2., alternatives involving no discharge (e.g. land application) could eliminate the water rights offset that now results from the wastewater discharge. If the City obtained no water rights from farmers who benefit from land application, this could decrease the municipal water right by up to 10,000 AFY in 2005.

Dewatering may be necessary for portions of the facilities construction; impacts and mitigation measures are similar to those described in section 6.2.5. Construction related to the outfall line will intrude into the Rio Grande. However, the placement of fill below the ordinary high-water elevation of the Rio Grande will not be necessary, and therefore a Section 404 permit (refer to Table 3-1) will not be required (see Appendix C for coordination letter). A Section 10 permit will also not be necessary because the Rio Grande is not considered a navigable water above the international border (Rosenau, 1981).

6.2.7 Impacts of Sludge Alternatives

A basic concern with land application is that contaminants might leach out of the sludge and into the underlying ground water. The contaminant of greatest concern is nitrate, which is a health hazard when present at high levels in drinking water. Sludge contains large amounts of nitrogen which may oxidize to nitrate when applied to the ground. Nitrate is very soluble in water, and so is easily transported down to the water table.

The applicant's preferred alternative involves application of wet sludge onto the West Mesa (see Figure 6-6). Long-term, adverse impacts on ground water should be minimized by this location, for the following reasons.

1. The water table at the proposed site is three to four hundred feet below the surface. Substantial amounts of seepage from the surface to the water table would be expected only if the water balance at the surface had a substantial surplus of moisture).

2. Potential evaporation in the Las Cruces area far exceeds rainfall. The maximum liquid application at the site will be 1.7 feet per year: rainfall averages 0.8 ft/yr. In comparison, actual soil evaporation is on the order of 5 feet, or twice the sum of the moisture supply. Consequently, on an annual basis, and except for short periods of wet weather, the site will have a negative water balance, and not a surplus of moisture at the surface. During wet weather, sludge can be stored for several days in the digesters and on existing drying beds, rather than being applied.

3. Existing wells in the area are generally of poor quality and low yield. Water quality samples taken from wells within 4 miles of the proposed application site are somewhat alkaline and show high levels of salts, especially fluoride (Wilson, et al., 1981). Levels in excess of drinking water standards were found for fluoride, chloride, sulfate, iron and conductivity. Thus, even if some contaminants

should reach the ground water, it would not be polluting a high-quality source of drinking water. Should the water be used for irrigation, the presence of nitrate would actually be an advantage, because of its value to crops.

This reasoning is supported by recent events concerning a proposed sewage treatment facility to be built at a prison planned to be located nearby. Raw sewage is to go into unlined lagoons and then into evaporation/seepage ponds. EID has indicated that this action will not cause the discharge of pollutants to ground water (Hicks, 1981). The same conclusion would apply to the proposed sludge injection, which involves a drier and somewhat less contaminated material. It is possible that EID could require installation of monitoring wells near the injection site to verify the absence of ground-water impacts.

No water pollution is likely from the landfill disposal proposed for the other alternatives. This conclusion reflects the same reasoning as developed for wet injection; that is, the water table is very deep at the landfill site, and potential evaporation far exceeds precipitation. EID has concured that the landfill does not pose a hazard to water quality (see appendix C).

6.2.8 Impacts of Other Alternatives

For the most part, actions taken with respect to energy conservation, odor control, administration, and funding have no direct impacts on water resources. Those impacts which do occur (e.g. adverse, short-term effects from construction of various facilities) are the same for all alternatives described in section 5.5.

The continued use of on-site systems in rural areas (section 5.5.1) has the potential to cause contamination of ground water, by the build-up of nitrates or other contaminants. However, state regulations require large lots (one-third acre) for such systems, which permit adequate dilution of discharges to ground water such that no contamination problem is likely. State regulations would also be expected to control potential pollution from independent treatment plants and other wastewater sources (section 5.5.6).

The use of chlorine for disinfection (section 5.5.2) has the potential to cause water-quality problems, such as toxic chlorine residuals and creation of trihalomethanes. Both potentials are considered insignificant in summer because of the high dilution of wastewater discharges. There is no use of the river for drinking purposes in winter, so that trihalomethane formation at that time (if any) would not cause any potential human health hazard; also, wastewater chlorination is not considered a major source of trihalomethanes. If chlorine residuals are excessive in winter, the fish populations of the river could be impacted, since at that time most if not all the aquatic environment is supplied largely by the Las Cruces effluent discharge. This impact can be avoided through normal operational measures.

Water conservation measures (section 5.5.5) would be expected to reduce the water supply and water rights needs of the City of Las Cruces, and would also reduce the wastewater discharge volume and water rights offset.

6.2.9 Impacts of EPA Alternatives

Funding of the applicant's preferred alternative, or any other cost-effective action, would provide a substantial incentive to improvements in water quality in the planning area by helping to correct an existing pollution problem. The wastewater discharge would continue to be reused effectively; adverse, short-term impacts from facilities construction and operation appear to be minor. Denial of funding would not relieve the applicant's obligation to correct the existing pollution problem.

6.3 AIR AND SOUND QUALITY

6.3.1 Existing Conditions

Air Quality. Table 6-6 lists New Mexico and Federal ambient air quality standards and compares them to data for the Las Cruces area; data stations are located on Figure 6-6. Air quality is generally good, but problems exist with particulates and carbon monoxide.

Total suspended particulate (TSP) levels (such as dust) regularly exceed State standards and Federal secondary standards. However, in large part this reflects a high level of natural background dust (Rinaldi, 1981) rather than controllable sources of direct human origin.

Carbon monoxide (CO) levels have also exceeded both State and Federal standards. The State Implementation Plan includes Las Cruces as a non-attainment area for CO. Specific non-attainment areas are that portion of the City of Las Cruces defined as follows: a) an area within a 1,000 foot radius from the Howard Johnsons' Motel at University Avenue and Valley Drive, b) a corridor, one block on either side of Picacho Avenue, extending from Valley Drive to Solano Drive, and c) a corridor, one block on either side of Solano Drive, extending from Picacho Avenue to University Avenue. These areas are within the downtown area or the vicinity of Interstate 10 (refer to Figure 6-8). State officials describe the Las Cruces CO problem as "slight" (Rinaldi, 1981); standards are expected to be obtained through the normal replacement of older vehicles with vehicles modified by factory-installed pollution control equipment. The monitoring station with the most complete data (6B, at 2600 South Valley Drive) shows a downward trend since 1977, and in fact 1979 data show no violation. However, as 1979 levels were still fairly high, EID plans to continue monitoring another year before recommending to EPA that non-attainment status be dropped.

Odors. Information on odors was collected from interviews with: residents, business proprietors, and school officials who live or work in the vicinity of the plant; plant operators; the Las Cruces Public Works Department; and the New Mexico Environmental Improvement Division (EID). No formal records of odor complaints are kept in Las Cruces.

TABLE 6-6. AIR QUALITY STANDARDS AND DATA FOR LAS CRUCES AND VICINITY

New Mexico Ambient Air Quality Standards are as set forth in section number 201 of the "Ambient Air Quality Standards and Air Quality Control Regulations." Federal Ambient Air Quality Primary and Secondary Standards are provided by the National Ambient Air Quality Standards (NAAQS) as established by the Environmental Protection Agency. State and federal annual standards are not to be exceeded at all, while federal short-term standards are not to be exceeded more than once a year.

Definitions of federal ambient air quality primary and secondary standards are as follows:

"National primary ambient air quality standards define levels of air quality which the Administrator judges are necessary, with an adequate margin of safety, to protect the public health. National secondary ambient air quality standards define levels of air quality which the Administrator judges necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant."[1]

Ambient Air Quality Standards	New Mexico Standard	Federal Primary Standard	Federal Secondary Standard	Annual Means and Standards Violated[2] 1975	1976	1977	1978	1979
Total Suspended Particulate (TSP) at Las Cruces 6B	Ug/m³ = micrograms per cubic meter							
1. 24-Hour Average	150 Ug/m³	260 Ug/m³	150 Ug/m³	S, FS	S, FS	S, FP, FS	NV	S, FS
2. Annual Geometric Mean	60 Ug/m³	75 Ug/m³	60 Ug/m³	70	82	83	72	87
Sulfur Dioxide (SO_2)[3]								
1. 24-Hour Average	0.10 ppm	0.14 ppm	--	NV	NV	-	NV	NV
2. Annual Arithmetic Mean	0.02 ppm	0.03 ppm	--	0	0	-	.001	.002
3. 3-Hour Average	--	--	0.50 ppm	NV	NV	-	NV	-
Carbon Monoxide (CO) at Las Cruces 6W								
1. 8-Hour Average	8.7 ppm	9 ppm	9 ppm	S	S, F	S, F	S	NV
2. 1-Hour Average	13.1 ppm	35 ppm	35 ppm	S	S	S	NV	NV
at Las Cruces 6ZA								
1. 8-Hour Average				-	S, F	NV	-	S, F
2. 1-Hour Average				-	S	NV	-	S
Photochemical Oxidants (Ozone) at Dona Ana								
1. 1-Hour Average (previous std.)	0.06 ppm	0.08 ppm	0.08 ppm					
1-Hour Average (promulgated 1979)		0.12 ppm	0.12 ppm	S[4]	-	-	-	No data yet
Nitrogen Dioxide (NO_2) at Las Cruces 6B								
1. 24-Hour Average	0.10 ppm	--	--	-	-	NV	NV	NV
2. Annual Arithmetic Mean	0.05 ppm	0.05 ppm	0.05 ppm	-	-	.0152	.0128	.0135

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1. Code of Federal Regulations, (40 CFR 50 2b) Office of the Federal Register, July 1, 1976, p. 4.
2. Short-term Standards: S = State standard, F = Federal standard, FP = Federal primary, FS = Federal secondary, NV = No violation.
3. 1975 and 1976 data for Santo Thomas, 3 miles south of planning area; 1978 and 1979 data for La Union, 20 miles south of planning area.
4. Data considered invalid by New Mexico Environmental Improvement Division.

Sources: EID, 1978b; Rinaldi, 1981.

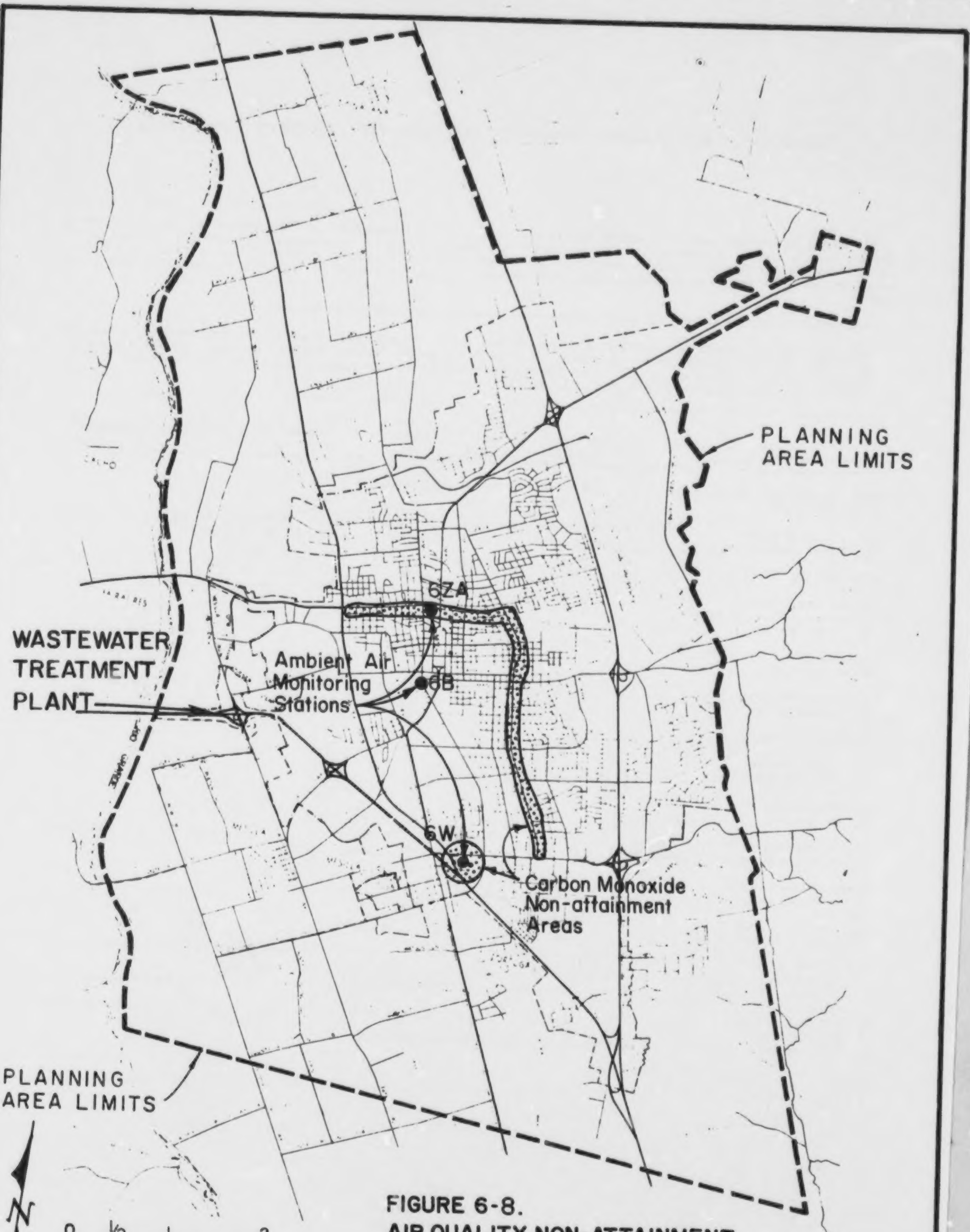

PLANNING AREA LIMITS
6ZA
WASTEWATER TREATMENT PLANT
Ambient Air Monitoring Stations
6B
6W
Carbon Monoxide Non-attainment Areas
PLANNING AREA LIMITS
N
0
1/2
1
2
GRAPHIC SCALE (miles)

FIGURE 6-8.
AIR QUALITY NON-ATTAINMENT AREAS
Source: Rinaldi, 1981.

An odor survey performed for this EIS found that odors in the vicinity of the treatment plant are noticeable at all times of the day, and particularly at night and when winds are from the west. Figure 6-9 gives the predominant wind directions by month. One complaint was recorded as far to the northeast as Valley Drive and Hadley Avenue; however no odors have been noted at MacArthur School, a few blocks further northeast and 1 1/2 miles from the treatment plant. No complaints were received for the area just south of Interstate Highway 10 near the plant. The findings of the odor survey were similar to the results of a similar survey conducted in the same area in 1972, namely that odors were noticeable and at times quite offensive in the immediate vicinity just east of the plant.

Several persons mentioned that the odor problem has lessened in recent years (presumably due to improvements at the plant in 1975). Few respondents to the 1980 survey felt property values were adversely affected. The EIS survey is public information; a complete record of the questions and answers is on file with Lee Wilson and Associates, PO Box 931, Santa Fe NM, 87501.

The plant is not the only odor source of concern. The EID has received several odor complaints, from individuals noticing odors from dried sludge used as a soil conditioner at public housing areas (a practice now discontinued), and from swimmers and hunters who have noted smells and floating debris near Mesilla Dam (Hendrickson, 1980). The Utilities Department of the City has received complaints concerning odors at the Barker lift station near Mesilla. These complaints led to a lawsuit by the Dona Ana District Attorney against the City of Las Cruces in 1978. Odors were reduced by installation of an air compressor which eliminated venting of the odors in the wet well of the lift station; now the odors by-pass the wet well and enter the force main to the treatment plant, where they presumably add to the problems there. Complaints of odors at the Barker lift station are still received several times per year. The University lift station has been a similar odor source, and City improvements there have reduced the frequency of complaints. Elsewhere in the City, occassional complaints are received in response to backups at flat and/ or sand-blocked collection lines (refer to Appendix A).

Noise. There are no persistent, unusual sources of noise in Las Cruces and the City airport does not handle scheduled commercial or jet traffic. DPEC (1977) cites ground traffic as the most common noise source, eliciting only occasional complaints. The City code prohibits unreasonable noise but does not include quantitative standards. DPEC (1977) cites utilization of land use planning and landscaping as the preferable method of minimizing noise impacts.

The wastewater treatment plant is in a sparsely inhabited residential/ business area adjacent to an interstate highway interchange. Background noise levels at the property boundary ranged from the low 50's to the high 80's dB(A) as measured for this EIS; refer to Appendix A for more detailed noise data. Noise levels near freeway traffic are normally around 70 dB(A); residential noise levels are 40-50 dB(A). Other than residences, the closest sensitive receptor is MacArthur School, 1 1/2 miles to the northeast. No

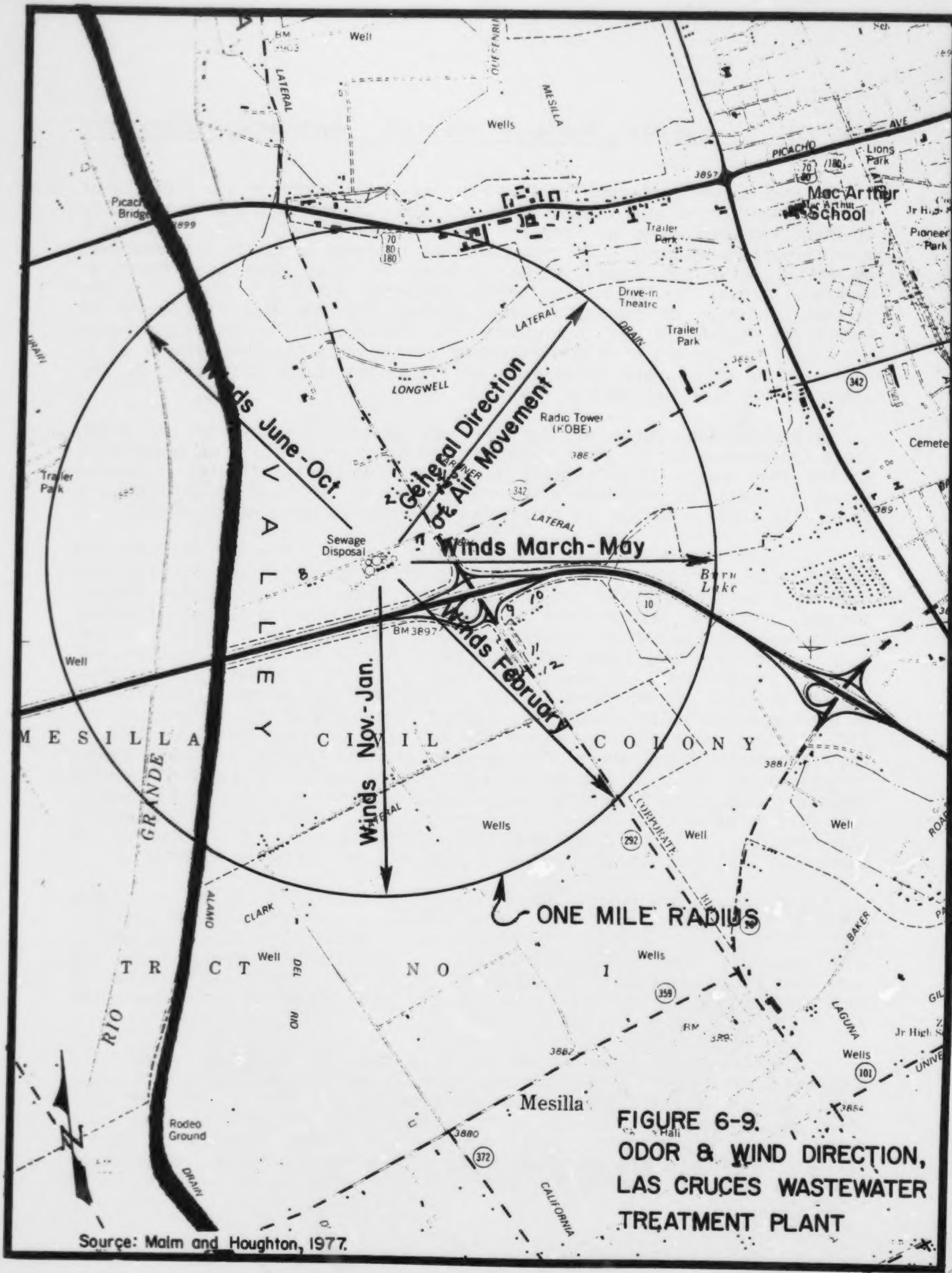

General Direction of Air Movement
Winds June-Oct.
Winds March-May
Winds February
Winds Nov.-Jan.
ONE MILE RADIUS
Sewage Disposal
Radio Tower (KOBE)
Drive-in Theatre
Trailer Park
Mac Arthur School
Lions Park
Pioneer Park
Picacho Bridge
PICACHO AVE
LONGWELL
LATERAL
DRAIN
MESILLA
MESILLA VALLEY
CIVIL COLONY
TRACT NO 1
RIO GRANDE
Wells
Well
Burn Lake
Cemetery
ALAMO
CLARK
DEL RIO
BAKER
LAGUNA
CALIFORNIA
CORPORATE
Mesilla
Rodeo Ground
N

FIGURE 6-9. ODOR & WIND DIRECTION, LAS CRUCES WASTEWATER TREATMENT PLANT

Source: Malm and Houghton, 1977.

complaints have been reported concerning noise in either the vicinity of the treatment plant or the lift stations.

Light. According to the Las Cruces Planning Department (DPEC (1977), glare and sky glow from outdoor lighting in Las Cruces adversely affects astronomical research at New Mexico State University's Tortugas Mountain Observatory located 61 kilometers (38 miles) northwest of Las Cruces.

Other Problems. A common complaint not related to odors was that the plant is a source of flies; some people also termed it unsightly. (Note: the City plans to continue to use parasitic wasps to control flies.) Comments were made that the plant contributes to aesthetic problems in the area associated with heavy truck traffic in and near the Interstate.

6.3.2 Impacts of the No Action Alternative

The No Action Alternative would fail to solve the existing odor problems at the treatment plant and the Barker lift station. It would favor sprawling development in presently rural areas, with attendant increases in traffic and thus greater vehicle emissions and noise.

6.3.3 Impacts of Collection Alternatives

Short-Term adverse impacts on air and sound quality will occur due to the construction activities associated with the interceptor installation and the lift station construction or renovation.

Air Quality. Dust may be generated at a construction site by soil disturbances and vehicle movement, by wind erosion of excavated material, and by operations such as concrete mixing and blasting. Construction dust is a nuisance material which causes annoyance, soiling and, in some cases, impaired local visability. If a large dust source is created near a residential area or major thoroughfare, positive dust control can be obtained through: a) spraying loose and erodible material with water during construction; and/or b) mulching and reseeding of a surface which had a natural plant cover prior to construction. Where reseeding is deemed necessary, it is generally preferable to use native grasses which will flourish once established.

The exhaust from gasoline or diesel-powered equipment is the main source of non-particulate air pollutant emissions at most construction sites. Emissions will be small compared to regional quantities, and would mainly have a localized impact during periods when air ventilation is poor. Fumes and odors might reach an annoyance level, but strict enforcement of OSHA (Occupational Safety and Health Administration) standards to protect construction workers should protect area residents against health impacts, although annoyance and irritation may occur.

Odors. Over the long term, the overall improvement of the collection system should reduce odor problems of the type which have been noted in the past due to malfunction or overload of system elements.

Noise. Noise levels at a sewer construction site would typically be elevated above normal background levels. Within 50 feet of active equipment, levels of 65-80 dBA would be expected to occur throughout the work day, with peaks to 85-90 dBA. These levels would be lowered by at least 6 dBA with each doubling of distance from the site and by a greater amount where the site is screened by vegetation or buildings. Vibrations could be associated with use of some equipment and operation of pumps for dewatering may involve noise generation during night time periods. The noise will be experienced for only a few days at any one location. The primary adverse impacts are short-term and will include an increase in public annoyance, possible interference with speech (e.g. at a school), and possible interference with daytime sleeping. Based on present plans, there would be no adverse impact on any major medical facility.

Many of the noises associated with collection system construction may be considered extremely annoying - grinding, squeaking, or hissing in character. The impact of the construction noise can be mitigated to some extent by restricting work to the hours between 7 a.m. and 7 p.m. under normal circumstances, and by requiring that all construction equipment utilize noise controls equivalent to that installed at the factory. References such as Schomer and Homans (1975), contain additional information on noise control.

6.3.4 Impacts of Treatment Alternatives

Construction of new treatment facilities would have impacts comparable to those described for the collection system: some dust, fumes and noise. The location of the facility (near a major Interstate interchange) should minimize the significance of these impacts on adjacent properties. The improvements to the treatment plant are expected to substantially eliminate the long-standing chronic odor probems at the facility, except for the aerated lagoon treatment alternative, which could result in some continued odor problem.

Lighting of the plant would marginally increase the light pollution problem described in section 6.3.1. This long-term adverse impact would be mitigated by the fact that, as an energy-conservation measure, lighting will be used on an as-needed basis. Also, refractors and shielding would direct light downward.

6.3.5 Impacts of Sludge Alternatives

All sludge alternatives call for trucking of the sludge to the disposal site. The emissions from the trucks and disposal equipment would contribute a negligible amount of air pollutants to the vicinity.

Combustion of digester gas would result in emission of some air pollutants. At design conditions, the emissions are estimated to be about 12 tons/yr of nitrogen oxide, 0.5 ton/yr particulates, 3 tons/yr of carbon monoxide, 1 ton/yr of hydrocarbons, and 0.1 ton/yr of sulfur dioxide, if the digester gas were not scrubbed before combustion (EPA, 1975b). These emissions are a very small proportion of the total pollutant burden in the planning area.

Odors. Table 5-12 briefly summarizes the odor impacts of the four sludge alternatives. The proposed alternative is given the best rating because after being withdrawn from the digesters, the sludge would be removed to an area remote from populated areas. It is not expected that the wet injection site would produce excessive odors. The proposed alternative would actually improve odor conditions in the treatment plant vicinity, since it reduces the use of drying beds, which are characteristically an odor source. The other alternatives have the potential to increase odors somewhat: alternatives 2 and 3 call for even more extensive use of drying beds; alternative 4 requires that the sludge undergo a number of processes at the plant before the process which removes odors.

Noise. All alternatives call for trucking the sludge to the disposal site, and then using machinery to either inject or landfill the sludge. The trucks and machinery will create noise on the order of 70-80 dBA (at 50 feet). The truck noise (one round trip a day) would not effect a noticable increase in ambient noise levels, especially as the route is mostly on Interstate 10. Noise at the disposal sites would be in addition to existing sources: interstate highway, airport, and city refuse operations at the landfill. The disposal sites are well removed from populated areas so that any increase in noise should have little impact.

Other Problems. The preferred alternative would reduce fly population by removing a potential breeding habitat (drying beds).

6.3.6 Impacts of Other Alternatives

For the most part, actions taken with respect to on-site systems, disinfection, energy conservation, water conservation, other wastewater sources, administration, and funding have no impacts on air and sound quality. Those impacts which do occur (e.g. adverse short-term effects from construction of various facilities) are the same for all alternatives described in section 5.5.

Odor control alternatives are discussed in section 5.5.4 and are intended to eliminate the present odor problems at the treatment plant and lift station. Energy conservation proposals (section 5.5.3) have many secondary benefits, including reduced air pollution at power plant sources and, as noted in section 6.3.4, reduced light pollution at the treatment plant.

6.3.7 Impacts of EPA Alternatives

The major adverse impacts on air and sound quality are the short-term effects of project construction and long-term noise and emmissions at project facilities. These impacts are an unavoidable result of the actions which Las Cruces must take if it is to correct existing treatment deficiencies, and provide for orderly urban development. EPA alternatives do not alter these impacts, except that the normal funding process provides an added level of review which helps ensure that mitigation measures such as listed in Table 5-6 are incorporated into construction contracts. As was the case for water quality (section 6.2.8), EPA funding provides a positive incentive for the control of existing environmental problems (odors).

6.4 BIOLOGY

6.4.1 Existing Conditions

Las Cruces is in the Lower Sonoran Life Zone, characterized by natural communities associated with the desert and with oasis-like streams. These communities correspond to the planning area's natural units, discussed in Section 6.1.1: alluvial fan and valley.

Vegetation. In the valley floor natural unit vegetation originally consisted of a cottonwood forest with undergrowth of willows and marsh plants in wetter areas. Today all of this land in the planning area is in agricultural production, or is being urbanized. Remaining vegetation, other than cropland, consists mostly of introduced species such as salt cedar, elm and Russian olive along irrigation drains, plus scrub willow, four-wing saltbrush, cattail and other marsh vegetation. Riverside vegetation is sparse, and where found consists of saltgrass and occasional shrubs and cottonwoods. Cropland is planted mostly in cotton, alfalfa, vegetables and pecans.

Vegetation on the alluvial fans is sparse, consisting of dropseed and muhly grasses (50 percent of cover) and shrubs such as four-wing salt bush, creosote bush, yucca, and sand sage (SCS, 1980). Most alluvial fan vegetation is rated as poor potential wildlife habitat.

Wildlife. Clearing for flood control, water conservation and irrigation maintenance, plus cattle grazing and off-road vehicles have altered most of the natural wildlife habitat formerly associated with the Rio Grande (WRRS, 1980). Remaining riparian habitat contains small mammals such as muskrat, beaver, and skunks, and some upland game birds, wintering waterfowl and wading birds.

The U.S. Fish and Wildlife Service reports no listed or proposed endangered species in the planning area (USFWS, 1980; see letter in Appendix C). For this reason, any wastewater management actions proposed by the applicant and/or funded by EPA would have no effect on endangered species.

The New Mexico Game Commission owns and manages two game areas near the river: the Santo Tomas upland game-bird hunting area and the Picacho Bosque. Santo Tomas is 3,057 acres of rangeland just west of and above the Rio Grande across from Mesilla; quail are the most common birds. The Picacho Bosque is located about one mile north of Mesilla Dam on the west side of the river behind the levee. The site consists of about fifty acres of trees serving mostly as a bird habitat. The Picacho Bosque is somewhat dependent on wastewater from the Las Cruces treatment plant, in that the plant provides a continuing source of water. Hendrickson (1980) reports that duck hunters have complained of "grey stuff and sewage odors" in the vicinity of Mesilla Dam.

Both Santo Tomas and Picacho are considered to be of minor habitat value. The major riparian habitat of the Rio Grande Valley occurs 100 miles or more to the north, especially in the Bosque del Apache National Wildlife Refuge, a major wintering area that accomodates about 80,000 birds annually, and in the lake and marsh habitat areas of Elephant Butte and Caballo Reservoirs. Major upland habitats occur east of Las Cruces, in the Organ Mountains, the San Andres National Wildlife Refuge in the San Andres Mountains, the Jornada Experimental Range and White Sands National Monument.

Impact of Wastewater Discharge. A faunal analysis of the Rio Grande was performed as part of this EIS (Smartt, 1981). The study involved collection of fish and benthic macroinvertebrates (bottom-dwelling animals of visible size). An initial collection in February, 1981, involved a small pond in the river about one mile below the Las Cruces treatment plant outfall; most if not all the water in the pond was Las Cruces effluent. The remainder of the study involved sampling above and at the outfall point during periods when the river was flowing normally during the early irrigation season (March-May, 1981). Dissolved oxygen was measured at both sampling sites in this part of the study. Species diversity was used as the primary measure of ecologic conditions.

The small pond fed by effluent in the winter contained a significant fish population, including carp (*Cyprinus carpio*), river carp (*Carpoides carpio*), gizzard shad (*Dorosoma cepedianum*), channel catfish (*Ictalurus punctatus*), and large-mouth bass (*Micropturus salmoides*). By numbers, most of the fish were small minnows, such as the fathead minnow (*Pimephales promelas*) or red shiners (*Notropis lutrensis*). Based on biomass estimates, carp and gizzard shad dominated the pond. The macroinvertebrate fauna was dominated by chironomid fly larvae. Clearly, despite the fact that the effluent pond was foul smelling, the discharge of effluent during the winter is capable of supporting a sizeable biological population.

During the irrigation season most of the same fish species (as well as some sunfish) were found above the plant discharge, while at the discharge point there were generally no fish at all, or (in 1 sample) a small population of mosquito fish (*Gambusia affinis*). Dissolved oxygen levels were typically 8-9 mg/l above the discharge, and 5.5-7 mg/l at the outfall. The lower dissolved oxygen at the outfall point is consistent with the observation that fish are largely absent in this reach of the river.

The macroinvertebrate populations above and at the discharge point were, on the whole, similar in diversity. However, the species found at the outfall point were more indicative of polluted water than those above it. For example, above the plant the species include a mixture of gastropods (snails), pelecypods (clams), annelids (worms) and ceratopogonids (biting midges). Worms and larvae of pollution-tolerant flies were more common at the outfall point. A diversity index computed at both sites was about the same, and typical of moderately polluted streams.

Based on the faunal analysis, improved quality in the effluent discharged by Las Cruces would improve ecological conditions in the Rio Grande, by providing an environment more conducive to pollution-sensitive species. In particular, this would benefit fish species in the reach of the river immediately below the discharge point. Continued discharge of wastewater in winter would be essential to maintaining significant biological populations during the period when the river would otherwise be virtually dry.

6.4.2 Impacts of No Action Alternative

The No Action Alternative would fail to solve the existing impacts of the treatment plant, as described above.

6.4.3 Impacts of Collection Alternatives

Construction of collection facilities would have limited, short-term impacts on the biologic environment. Most proposed construction would not cross any area of natural or semi-natural vegetation. A major exception would be lines installed adjacent to or in arroyos (interceptors 210 and 230). Interceptor construction in Alameda arroyo would parallel an existing rock lined channel constructed by the Corps of Engineers to serve as an outlet to the Las Cruces Dam. The Alameda Arroyo construction would be confined to the flood plain of the arroyo and would probably not disturb significant amounts of terrestrial habitat which was not previously disturbed by the construction of the rock-lined channel. Interceptor construction in Las Cruces Arroyo would follow the main flow line in the arroyo and construction activities would have a negative short-term impact on the mesquite-scrub growth in the arroyo which provides a habitat for birds and other fauna. None of the lines proposed would cross an area of woodland or bosque, or alter a significant terrestrial or aquatic habitat.

Mitigation of the adverse impacts can be accomplished by: careful marking of the construction site, with prohibition of activity outside designated areas; protection of trees outside of the right-of-way; storage of topsoil, and replacement of same atop the completed trench; use of removed vegetation as a mulch on the bared soil, to help protect it from erosion and to provide seeds and nutrients for regrowth; no use of pesticides, herbicides or defoliants; and reseeding of sites with native grasses which can be readily established without substantial outside sources of water.

6.4.4 Impacts of Treatment Alternatives

Short-term, adverse impacts resulting from construction of new wastewater facilities would not involve any areas of natural vegetation. The discharge of treated wastewater from all alternatives would benefit aquatic wildlife by increasing the flow of the river; in winter, the wastewater is now and would remain the major source of water for pond habitats several miles below the treatment plant. The improved quality of the effluent would be expected to allow significant fish populations to live in the reach immediately below the outfall point. In the same reach, benthic macroinvertebrate populations would shift to more pollution-sensitive species (e.g. snails and clams would become more common). However, because of natural and non-point source pollution, the river would not become a highly productive aquatic ecosystem.

One of the seven treatment alternatives, aerated lagoons, could have extra wildlife benefits since it would create a large area of open ponds which would probably be utilized by some waterfowl and shorebirds.

6.4.5 Impacts of Sludge Alternatives

Implementation of the preferrred alternative would lead to removal of vegetation from up to 40 acres of rangeland, and would destroy any wildlife habitat (birds, rodent burrows) in that area. Other alternatives have a similar long-term impact, but would require only 10-15 acres of land over 25 years.

For the preferred alternative, the sludge application would improve the ability of the soils to support vegetation once injection stops. The habitat value of the site could be enhanced (and erosion problems reduced) if strips of the natural vegetation and soil are left undisturbed; this would create a more varied environment for the wildlife of the area, as well as a windbreak. The potential exists for birds to be attracted to the site, thus perhaps interfering with aircraft landing at the nearby airport (see Figure 6-6). In a similar situation at the Santa Fe, New Mexico sludge injection site, which is also adjacent to the airport, no problems with birds have been encountered (EPA, 1980).

6.4.6 Impacts of Other Alternatives

For the most part, actions taken with respect to on-site systems, energy conservation, odor control, water conservation, other wastewater sources, administration, and funding have no impacts on biology. Those impacts which do occur (e.g. from construction of various facilities) are the same for all alternatives described in section 5.5.

6.4.7 Impacts of EPA Alternatives

The major adverse, short-term impacts on biological resources result from construction of interceptors and new wastewater facilities. However, beneficial, long-term impacts on aquatic life would result from improvements at the treatment plant. The use of a sludge application site would have adverse, long-term impacts by removing a small area of natural vegetation and wildlife habitat. These effects are an unavoidable result of the actions which Las Cruces must take if it is to correct existing treatment deficiencies, and provide for orderly urban development. EPA alternatives do not alter these impacts, except that the normal funding process provides an added level of review which helps ensure that mitigation measures such as listed in Table 5-6 are incorporated into construction contracts. As was the case for water quality (section 6.2.8), EPA funding provides a positive incentive for improvement of the biologic environment.

6.5 ARCHAEOLOGY AND HISTORICAL RESOURCES

6.5.1 Existing Conditions

Archaeology. The Mesilla Valley contains many archaeological and historical resources left by people who inhabited the area over thousands of years. The oldest recognized cultural period is termed Paleo-Indian and refers to game hunters who roamed the grasslands that characterized parts of New Mexico more than 9,000 years ago. Paleo-Indian sites are characterized by distinctive lance-shaped spear tips found in association with camping, kill and butchering sites. The Paleo-Indian period was followed by a Desert Culture whose subsistence patterns were characterized by semi-nomadic hunting and gathering over a period of approximately 7000 years. Materials found at Desert Culture sites commonly include baskets, rock tools and an early form of domestic maize.

Mogollon farming societies evolved from the Desert Culture and extended from approximately 2000 years ago nearly to historic times. This culture was characterized by domestication of crops, permanent settlements and ceramic technology. The culture reached its height between 800-1100 A.D. Severe drought conditions occurred between 1100-1200 A.D. which made agricultural pursuits difficult. It has been proposed that this climate change, plus the immigration of Athabascan-speaking Indians eventually displaced the Mogollon groups. When Spanish explorers arrived the Mogollon people were gone, leaving numerous cliff dwelling ruins. By that time southwestern New Mexico had become an Apache stronghold.

History. The historic period of the Mesilla Valley began in 1536 with the arrival of the Spanish. The area became a link between Spanish settlements at El Paso and Santa Fe. Las Cruces was founded as an offshoot community of the village of Dona Ana in 1849. Mesilla was settled in 1850 because of population pressures in Las Cruces, and in 1854 Mesilla became the first seat of the government of the Territory of New Mexico. Fort Fillmore was established in

1851 providing an inducement to growth of the area. In 1852 Las Cruces was made the seat of Dona Ana County.

Registered Sites. Sites recommended for or listed on the National and/or State Registers of Historic Places are presented on Table 6-7 and shown on Figure 6-10. The Alameda-Depot and Mesquite Street-Original Townsite Historic Districts were recently added to the State list and have been recommended for nomination to the Federal Register of Historic Places, along with the revised La Mesilla Historic District. A few sites of archaeological interest have also been discovered in the area, and records on these sites are on file with the Museum of New Mexico Laboratory of Anthropology in Santa Fe. The sites shown on Figure 6-10 are those discovered during highway right-of-way surveys and highway construction, and no longer exist. No part of the planning area has ever been systematically surveyed for archaeological resources.

In general, sites within the floodplain would have been erased by the meandering of the Rio Grande or covered by alluvial deposits (Beckett, 1980). Areas richest in archaeological resources would be east and west of the Rio Grande above the floodplain, such as along arroyos. The likelihood of finding additional sites of archaeological or historic interest is high given the rich history of the area.

6.5.2 Impacts of No Action Alternative

Without some action to correct the remaining deficiencies at the Barker lift station, odors from that source could be noticeable at La Mesilla Historic District. No other direct impacts to historical or archaeological properties would be expected under the No Action Alternative.

6.5.3 Impacts of Collection Alternatives

Historic Sites. Sewer construction is proposed in or near several of the registered historic sites and districts of the Las Cruces area.

TABLE 6-7. REGISTERED HISTORIC SITES.

Historic Site or District	National Register	State Register
Alameda-Depot Historic District	X[1]	X
Amador Building		X
Armijo (Nestor) House	X	X
La Mesilla Historic District	X[1]	X
Mesilla Plaza (National Historic Landmark)	X	X
Mesquite Street-Original Townsite Historic Dist.	X[1]	X
Rhodes-Garrett-Hamiel Dormitory		X
Taylor (J.Paul) Property (Barela-Reynolds House)	X	X

[1] Has been recommended by the Cultural Properties Review Committee for nomination to the National Register.

Sources: Merlan, 1980; Brooker, 1981.

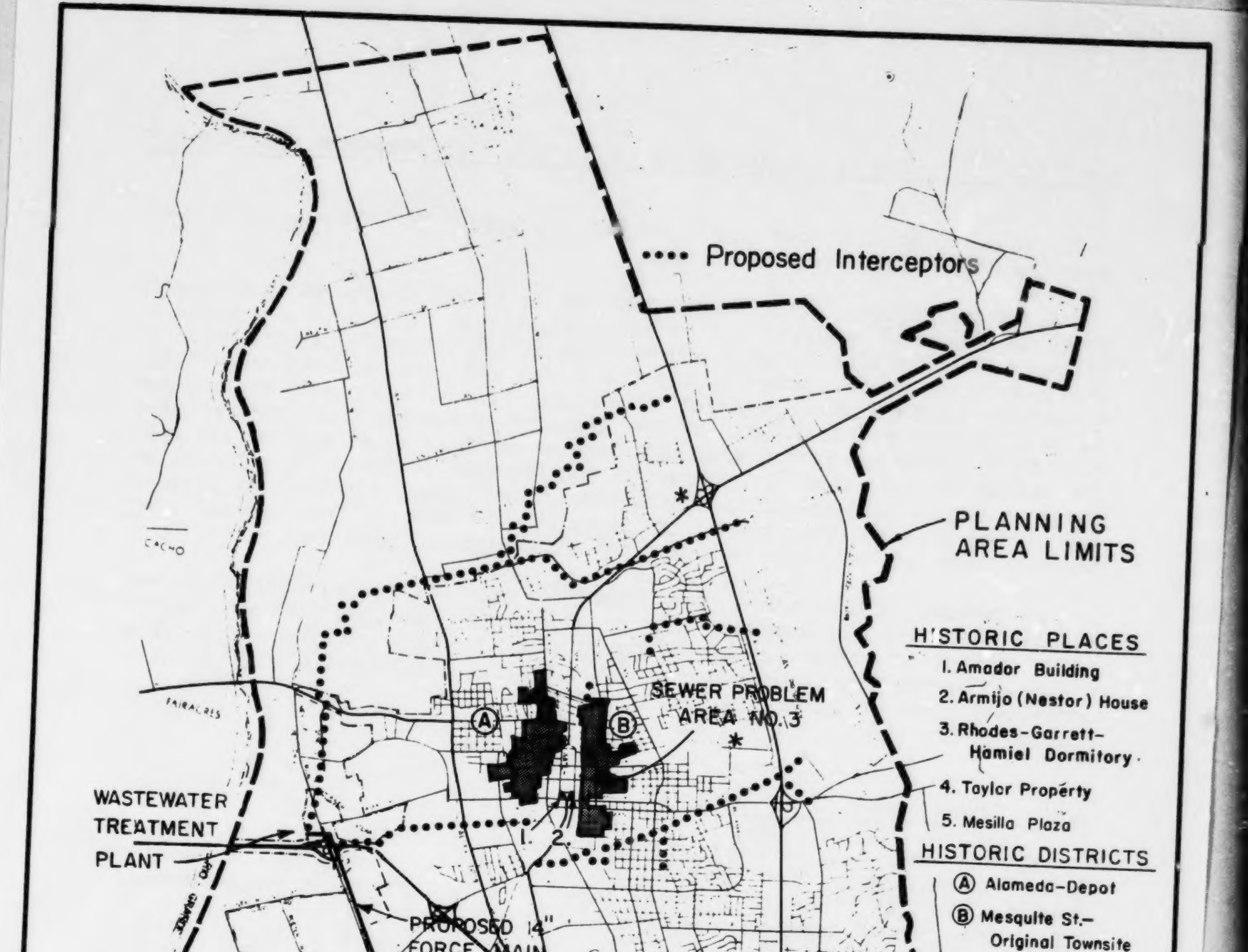

•••• Proposed Interceptors
PLANNING AREA LIMITS
HISTORIC PLACES
1. Amador Building
2. Armijo (Nestor) House
3. Rhodes-Garrett-Hamiel Dormitory
4. Taylor Property
5. Mesilla Plaza
HISTORIC DISTRICTS
Ⓐ Alameda-Depot
Ⓑ Mesquite St.-Original Townsite
Ⓒ La Mesilla
* Archeological Sites
SEWER PROBLEM AREA NO. 3
WASTEWATER TREATMENT PLANT
PROPOSED 14" FORCE MAIN
BARKER LIFT STATION
MESILLA LIFT STATION
4. & 5.
1.
2.
3.
A
B
C
CACHO
FAIRACRES
RIO GRANDE
PLANNING AREA LIMITS
N
0
1/2
1
2
GRAPHIC SCALE (miles)

FIGURE 6-10.

HISTORIC, ARCHEOLOGICAL & CULTURAL SITES

Source: Merlan, 1980; Brooker, 1981.

- Correction of sewer problem area number 3 involves construction within the Mesquite Street-Original Townsite Historic District. The proposal is to install a new line beneath Griggs Avenue, a new manhole on Mesquite Street just north of Griggs Avenue, and a second manhole on Griggs Avenue midway between San Pedro Street and Mesquite Street. According to the design engineer the construction would be confined to an area which is contained within the existing street right-of-way.

- Renovations of the existing Mesilla and Barker Road lift stations, and construction of the new force main, would take place adjacent to the La Mesilla Historic District (Figure 6-10) within the right-of-way of STate Highway 28.

- The routes for proposed interceptors #230 and #270 pass to the south of the Mesquite Street-Original Townsite Historic District and the Alameda-Depot Historic District, respectively. These lines generally follow existing arroyos and streets. No line work is proposed within the districts, though alternative routes for some lines could pass through the areas.

Nearby historic structures should suffer minimal adverse impacts from these proposed actions since construction activities would either be confined to existing streets and easements or to existing fenced property at the lift station sites. Potential adverse impacts are short-term increases in noise and dust during the construction phase of the proposed action, which would diminish the enjoyment of residents and visitors, and long-term damage to building foundations due to soil compression from backfilling of trenches. Possible mitigation measures include selective use of flooding for compaction, or using hand-held compaction tools instead of heavy vibrator-compactor vehicles.

Archaeologic Sites. The State Historic Preservation Officer has recommended that any alternative chosen include a site-specific survey by a qualified archeologist in order to identify and catalog any sites and to recommend mitigation measures (Merlan, 1980; see letter in Appendix C). Such a survey would be undertaken after detailed design work selects specific routes for sewer lines.

EPA will require the City to perform an archaeological reconnaissance survey during the design phase of each construction project to determine if any archaeological and/or historical resources will be affected. The survey shall be performed as soon as the tentative right-of-way of the construction is known, in order to permit rerouting, if necessary. Any archaeological and/or historical resources discovered will be evaluated in accordance with the "Procedures for the Protection of Historic and Cultural Properties", as published in the Federal Register (36 CFR, Part 800). This requirement will be a grant condition; the Advisory Council on Historic Preservation will be allowed to comment on this grant condition.

Some archaeological resources not identified during project design may become evident only upon excavation of a trench. Should any resources be discovered during construction, work will be halted until the cultural significance of the materials can be determined and compliance with all applicable laws and regulations can be assured. Copies of the archaeological clearance of each project will be filed with the State Historic Preservation Officer, Santa Fe. His letter regarding the overall project, as now planned, is provided in Appendix C.

6.5.4 Impacts of Treatment Alternatives

No known archaeological sites occur within the area which would be affected by facilities construction; because of the valley location, major sites would not be expected. However, as for collection lines, a site-specific survey will be required during project design.

6.5.5 Impacts of Sludge Alternatives

One archaeological site has been identified in the vicinity of the proposed application site (see State Historical Preservation Officer's letter of September 30, 1981, in Appendix C). No determination has been made as to whether or not the site is eligible for the National Register of Historic Places. As indicated on the map accompanying a letter from Molzen-Corbin and Associates to Ken Needham, dated October 8, 1981 (refer Appendix C) the site is a lithic scatter which covers the entire northern half of section 33 and 34, T23S, R1W. The proposed sludge injection includes part of Section 33, and so may contain archaeological resources. A site-specific survey will be required if this alternative is selected for design; if any sites eligible for the National Register of Historic Places are identified, appropriate mitigation measures will be taken prior to initiating injection activities (Merlan, 1981).

6.5.6 Impacts of Other Alternatives

For the most part, actions taken with respect to on-site systems, disinfection, energy conservation, odor control, water conservation, other wastewater sources, administration, and funding have no impacts on archeological resources. Those impacts which do occur (e.g., from construction of various facilities) are the same for all alternatives described in section 5.5.

6.5.7 Impacts of EPA Alternatives

Potential for adverse impacts on archeological resources may result from construction of interceptors, improvements at the treatment plant, and use of a sludge application site. Such impacts would be the unavoidable result of the actions which Las Cruces must take if it is to correct existing treatment deficiencies, and provide for orderly urban development. EPA alternatives do not alter these impacts, except that the normal funding process provides an added level of review which helps ensure that mitigation measures such as those mentioned above and those listed in Table 5-6 are incorporated into construction contracts.

6.6 SOCIO-ECONOMICS AND LAND USE

6.6.1 Existing Conditions

This section considers a variety of factors which together make up the human landscape of the Las Cruces area. The discussion first considers basic information about the population and economy of the area, including the fiscal status of the City. Then, the section summarizes present patterns of land use in and near Las Cruces, as well as the infrastructure (facilities and services) which has been developed to support the development of the area. The agricultural lands of the region are emphasized, because of their food production and economic value. Finally, this section identifies land use policies and plans which serve to guide future development. Section 6.6.2, following, builds upon this information to project the scale and location of future development.

Population. The facility planning area is comprised of Las Cruces and Mesilla plus the unincorporated villages of Dona Ana, Tortugas, Mesilla Park and adjacent rural areas. No historical population figures for the planning area have seen published. Based on the Advance Reports of the U.S. Census, the 1980 population of the planning area was about 59,900.

Table 6-8 provides population data for Dona Ana County, Las Cruces and Mesilla for the period 1950-1980. Dona Ana County has experienced steady economic and population growth in this period. Until 1950, nearly 70% of the County's population was classified as rural. The shift to increased urbanization began with the establishment of the federally-operated White Sands Missile Range (late 1940's) and NASA testing facilities (early 1960's).

TABLE 6-8. POPULATION, 1950-1980.

	1950	1960	1970	1980	Increase 1970-80
Dona Ana Co.	39,557	59,948	69,773	96,340	38.1%
Las Cruces	12,325	29,367	37,857	45,086	19.1%
Mesilla	*	1,264	1,713	2,029	18.4%

* No data; Mesilla was unincorporated in 1950.

Source: USBC: 1950a, 1960, 1971, 1981.

Most of the growth since 1950 has been within the City of Las Cruces; the City's growth rate between 1950 and 1960 averaged 13.8 percent per year, largely due to jobs created by the federal facilities. The City's population increased by 19.1 percent from 1970 to 1980, as indicated in Table 6-8. The Town of Mesilla was a major population center in the mid 1800's; an 1850 census recorded a population of 3,000 in Mesilla, compared to 600 for Las Cruces in 1854. In 1881, the railroad bypassed Mesilla for Las Cruces which soon became the trade center. The population of Mesilla had decreased to 1,264 when it incorporated in 1959 (Yguado, 1973a). Since that time the population of Mesilla has steadily grown to 2,029 (Table 6-8). Based on the 1980 census, the population of the area is dominantly (52%) of Spanish origin; other ethnic groups are present in small numbers.

Economy. Until World War II, the economy of the Mesilla Valley had an agricultural base. Since that time, government employment has become dominant, due to the growth of the federal facilities and New Mexico State University. Table 6-9 summarizes employment by basic economic sector. Agriculture remains an important part of the economy, as indicated by data in Tables 6-9 and 6-10.

TABLE 6-9. AVERAGE ANNUAL EMPLOYMENT, BY SECTOR, DONA ANA COUNTY 1950-1980.

Employment Sector	1950	1980	Change 1950-1980	Share of 1980 Total Employment
Total Civilian Employment	11,380	30,642	+ 169%	100.0%
Agriculture	3,693	1,117	- 70%	3.6%
Nonagricultural				
Wage & Salary	7,687	29,525	+ 384%	96.4%
Manufacturing	290	2,625	+ 805%	8.6%
Mining	38	*	-	-
Contract Construction	1,042	1,800	+ 73%	5.9%
Transportation & Public Utilities	673	1,150	+ 71%	3.8%
Wholesale & Retail Trade	1,909	5,375	+ 182%	17.5%
Finance, Insurance & Real Estate	159	1,175	+ 639%	3.8%
Services, Misc.	2,681	4,000	+ 49%	13.1%
Governments	895	13,400	+ 1,397%	43.7%

* Included under Services, Misc.

Sources: NMESD, 1981; BBER, 1980; USBC, 1950.

TABLE 6-10. FARM SIZE, VALUES AND INCOME, DONA ANA COUNTY.

Year	Number Farms	Average Acres	Average Value of Property	Market Value of Products Sold	Farm Income Average
1964	869	761.5	$133,715	$28,078,000	$32,311
1969	768	840.0	$162,736	$32,086,000	$53,477
1974	767	629.0	$208,018	$53,694,000	$70,005
1978	848	486.0	$302,689	$83,306,000	$98,806

Sources: BBER, 1979 and 1980; USBC, 1980.

Agricultural employment in the County decreased between 1950 and 1980, but the number of farms has increased in recent years, as has the value of property and crop production. Estimates for 1977 indicated that Dona Ana County had the highest value of crop production of all New Mexico counties: $32,901,300 or approximately 16 percent of the State's total market value of agricultural products sold (BBER, 1980).

Overall, the County experienced a large increase in non-agricultural employment between 1950 and 1980. Government jobs provide over 43 percent of total employment, which is far above the national average of 15.6 percent. Both WSMR and NASA experienced a decrease of jobs between the peak of the early 1960's and 1976. Since 1976, employment levels have stabilized or increased slightly, due in part to the Space Shuttle Program. The number of employees at the NASA test facility has increased from approximately 300 in 1976 to 750 in 1980. Annual average civilian employment at White Sands from 1974 through 1980 has remained about 3,300 persons (Costillo, 1980).

New Mexico State University is a large employer in the government sector and a source of research and technical personnel in Las Cruces. Enrollment at the University increased 251 percent between 1960 and 1976, creating more jobs and establishing Las Cruces as a major research and education center. State research facilities such as the Water Resources Research Institute, the Agricultural Experiment Station and the Solar Research Institute have been factors in population growth and the location of more businesses in Las Cruces because of the availability of technical expertise.

Las Cruces contains a variety of business firms, many of which are in the food-processing industry. The Las Cruces Industrial Development Board, a coalition of City, County, and business concerns, actively recruits industry. New businesses in the area include manufacturers of aircraft and space parts; producers of synthetic furs; and a large retail mall.

The County unemployment rate for 1980 was 8.0%, compared to a state unemployment rate of 7.4% (New Mexico Enmployment Security Dept., 1981). Per capita and median income levels in Las Cruces are higher than those of Dona Ana County and New Mexico, but about 15% less than the national average. Much of this latter difference is offset by a reduced cost of living.

Public Finance. The fiscal capacity of local government is of special interest in wastewater planning. Table 6-11 presents fiscal information on Dona Ana County, the City of Las Cruces, and the Town of Mesilla; it also tabulates bonded indebtedness for Las Cruces. Las Cruces had a budget deficit of over $1 million in 1979-80, 20 times greater than the 1978-79 deficit; the budget itself increased only 5 percent in the same period. The increased deficit was caused primarily by decreases in receipts from state-shared taxes and cuts in Revenue Sharing funds. Utility service revenues constitute approximately 37 percent of the City's current budget (DFA, 1981a).

The budget deficits for Las Cruces reflect the fact that the City is growing rapidly; income from recent population and commercial growth has not

TABLE 6-11. FISCAL INFORMATION FOR LOCAL GOVERNMENTAL UNITS.

A. BUDGET DATA

Fiscal Year		Dona Ana County	City of Las Cruces	Town of Mesilla
1978-79	Receipts	$5,203,595	$24,312,355	$286,418
	Disbursements	4,768,122	24,360,060	296,966
	Balance	+435,473	-$47,705	-10,548
1979-80	Receipts	$4,742,115	$25,617,411	$570,324
	Disbursements	4,578,726	26,788,454	539,711
	Balance	+163,389	-1,171,043	+$30,613

B. GENERAL OBLIGATION BONDED INDEBTEDNESS, LAS CRUCES

	Water/Sewer	General	Total	Cash Balance	Outstanding
June 79	$4,030,000	$605,000	$4,635,000	$1,328,200[1]	$3,306,800
June 80	$3,410,000	$250,000	$3,660,000	$1,429,064[1]	$2,230,936

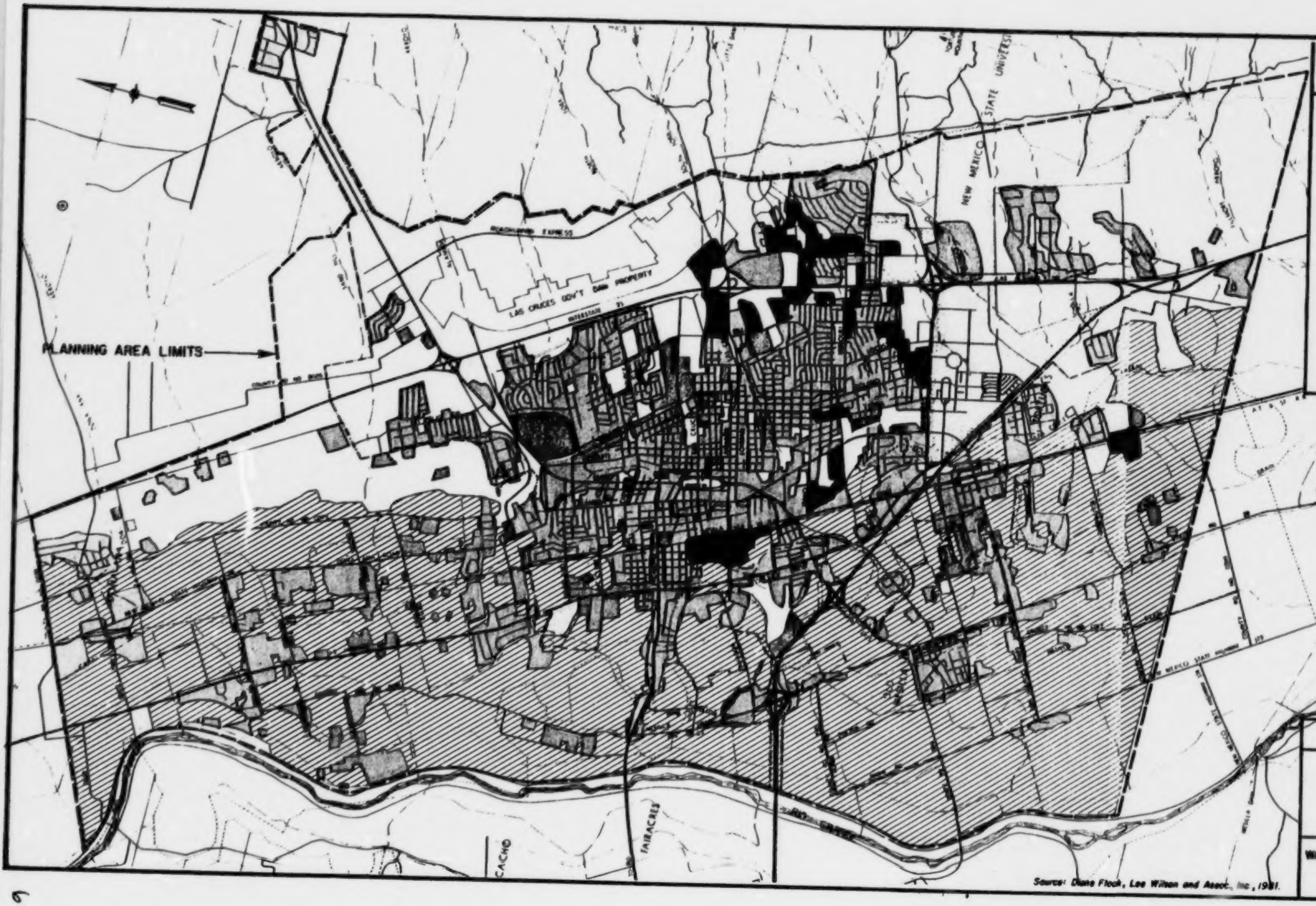
[1] Interest and sinking funds combined.

Sources: DFA, 1979 and 1981a.

yet caught up with the City's cost of providing expanded services and facilities. Relatively low taxes are one of the factors attracting people and businesses to Las Cruces; the tax structure may need to be revised or new bonds floated to accommodate the increased demand for services. In addition, traditional sources of municipal income such as Revenue Sharing are changing and the amount of revenue to be expected cannot always be accurately predicted. An indication of the financial stability of Las Cruces is its "A" bond rating.

The County and Town of Mesilla budgets are small but indicate a stable fiscal capacity. The County generates income from property and state-shared taxes which is spent on basic services, not including water or sewer. The Town of Mesilla receives income principally from Town and state-shared taxes which is spent on basic utility and community services. Neither Dona Ana County nor the Town of Mesilla has the fiscal capacity to issue General Obligation Bonds to finance major capital improvements.

Land Use. Within the municipal boundaries of Las Cruces, most of the land area is devoted to single-family residential use, as shown on Figure 6-11. Multi-family housing tends to be located near the New Mexico State University. Commercial activity occurs primarily along major streets in a pattern of strip commercial development. Several shopping centers adjacent to I-25 have recently opened or are in the planning stages. Manufacturing and wholesaling activities are located at both ends of Amador Street, concentrated near the railroad tracks at one end and the Interstate 25 junction at the other. Industrial development sites are located thoughout the area. Parks


PLANNING AREA LIMITS
LAS CRUCES GOV'T DAM PROPERTY
INTERSTATE 25
NEW MEXICO STATE UNIVERSITY
FAIRACRES
CACHO

Source: Diana Flock, Lee Wilson and Assoc., Inc., 1981.

● LEGEND ●

- ▨ **Significant Farmland** including undeveloped land with soils of significant agricultural value.
- ☐ **Vacant or Other Farmland**
- ▩ **Single-Family Residential**
- ■ **Multi-Family Residential**
- ▩ **Commercial**
- ■ **Industrial**
- ▩ **Recreational**
- ☐ **Public Institutional**

0 2000 4000 8000 ft.
GRAPHIC SCALE

LAS CRUCES, NEW MEXICO

EXISTING LAND USE

WASTEWATER MANAGEMENT PLAN
ENVIRONMENTAL IMPACT STATEMENT

FIGURE 6-11

and public buildings are scattered throughout the City of Las Cruces. The New Mexico State University campus is the major institutional land use and the only significant public land owner within the city limits. Approximately 40% of the municipal land is vacant (Las Cruces Planning Dept., 1980).

Land use in the Town of Mesilla is that of a traditional rural village. Most commercial activity is located adjacent to the Plaza, which is a National Historic Landmark. Single-family residential uses fan out from the Plaza. The majority of the land within the Town limits is used for irrigated agriculture. The unincorporated villages of Tortugas, Dona Ana and Mesilla Park are principally single-family residential in nature, adjacent to irrigated agricultural lands. These communities are old settlements rather than recently developed areas and have an identifiable sense of community due to the presence of local commercial establishments, schools, churches, and post offices.

The West Mesa area, although not part of the facility planning area, may be affected by the proposed sludge disposal. The municipal airport is located on the mesa; the land adjacent to the airport will be reserved as an airport protection zone. Nearby land is proposed for an industrial park development. The state has also proposed that a new corrections facility be built on the West Mesa.

The BLM has designated some lands immediately east of the planning area for urban use. In order to develop these lands, the City must prepare a master plan for development; this has not been done.

Land use adjacent to the existing wastewater treatment facility is primarily agricultural, with one large commercial center just north of the Interstate 10/State Highway 292 interchange, and several residences. The existence of the plant does not appear to create problems for neighboring land users with the exception of intermittent odor nuisances and flies.

Although many aspects of land use are important to wastewater planning, the issue of greatest public interest in Las Cruces has been the desire to protect, to the extent practicable, the environmentally significant agricultural lands of the Mesilla Valley. EPA policy has the same objective. To characterize these lands, it is useful first to identify other types of open space in the area.

Recreation, Open Space, Natural Areas. The City of Las Cruces maintains six mini-parks/play lots, ten neighborhood/community parks, the Downtown Mall, Bicentennial Park and several community recreation centers. Few developed and maintained parks are located elsewhere in the planning area, except for the University golf course, and two private courses (one in development). Additional public recreational areas are located outside the planning area. Campgrounds, picnic areas, and hiking are available in the Organ Mountains. Leasburg State Park is located on the Rio Grande about six miles north of Dona Ana. Hunting, fishing and swimming occur in and along the Rio Grande below the wastewater treatment plant. Hendrickson (1980) reports complaints regarding odors and visibly deteriorated water quality from persons swimming and fishing between the treatment plant and Mesilla Dam.

There are no designated open space or natural areas in the planning area although there is much vacant land that could be available for various recreational activities. A system of bike and pedestrian trails is being investigated by the City Planning Department as part of their overall transportation plan (Las Cruces Planning Dept., 1980c). Except for the few parks and golf courses, most of the open space is desert in character, in contrast to the relatively lush open space associated with agricultural lands.

The Las Cruces area has the fewest state parks and recreation areas, per capita, in the state, according to the State Parks and Recreation Commission (State Parks and Recreation Commission, 1974a). Concepts to provide more recreational areas include a river parkway system along the Rio Grande floodway from Elephant Butte to El Paso, proposed by the International Boundary and Water Commission to the New Mexico Parks and Recreation Commission (Johnson, 1981), and development of the old Rio Grande Trail through Dona Ana, Las Cruces and Mesilla, suggested as part of the State Trails Plan (State Parks and Recreation Commission, 1974). The status of both projects is doubtful because of recreational planning funding cut-backs.

Environmentally Significant Agricultural Lands. EPA has a policy to protect environmentally significant agricultural lands (see Table 3-1). Such lands are shown on Figure 6-11, based on an 'Important Farmland Inventory' performed by the Soil Conservation Service for Dona Ana County (SCS, 1979). The objective of the inventory was to identify the extent and location of the land best capable of producing food, fiber, forage, feed and oilseed crops. Such land can be farmed continuously or nearly continuously without degrading the environment, and it is very responsive to management for maintaining productivity.

There are approximately 28,800 acres of land devoted to agriculture within the City of Las Cruces and its five-mile planning and platting jurisdiction (Las Cruces Planning Dept., 1975). This represents more than 25% of the total irrigated cropland in Dona Ana County and about 8% of total irrigated farmland in New Mexico (BBER, 1980). Associated with this land is a system of drains, irrigation canals, and dams built and maintained by the Bureau of Reclamation or the Elephant Butte Irrigation District. There is no non-irrigated farming in the planning area.

About fifty percent of the agricultural land within the planning area is planted in cotton. Alfalfa and pecans are grown on 30-40 percent and the remaining 10-15 percent is planted in feed grains, chile, and vegetables such as lettuce, onions, tomatoes and corn (Las Cruces Planning Dept., 1975). In recent years there has been a shift in crop mix to include more intensive (greater output) and higher value crops such as chile and pecans. Although there are very large operations in the area, most farms are small to medium size enterprises. Approximately 70% of farms countywide have gross sales of under $40,000 (Eastman, et al., 1979).

Infrastructure. The term infrastructure refers to the network of community facilities, services and utilities which support life in an urban area. Knowledge of the infrastructure framework is essential to wastewater planning for two reasons. First, it helps determine environmental conditions which interact with wastewater facility construction and operation, such as utilities, storm runoff hazards, energy availability, and transportation-related air and noise pollution. Second, knowledge of infrastructure is important in assessing the secondary land use consequences of extending sewerage utilities because development tends to occur where adequate facilities and services are present. Components of the infrastructure network discussed below are: water utilities; wastewater utilities; on-site wastewater systems; solid waste management; storm drainage; energy and communications utilities; and transportation.

a. Water Utilities. Water is supplied to residents of the planning area by one municipal, three community, and eight private water systems, plus individual wells (Figure 6-12). The largest system is operated by the City of Las Cruces and consists of eighteen service and two emergency wells with a total pumping capacity of 23 million gallons per day. The City pumps water from two production fields. Water drawn from the east mesa field yields variable quantities and qualities. Water drawn from the valley field is of better quality; the newest city wells were drilled in this field. Water from all City wells is chlorinated to protect against bacteriological contamination in the distribution lines. The distribution system includes three booster stations, seven storage tanks and hundreds of miles of supply lines (DPEC, 1977). The City's seven storage tanks have a maximum capacity of 15 million gallons. The water transmission system is divided into four substantially independent service zones due to the difference of more than 500 feet in elevation between the highest and lowest points in the service area.

Future population growth will necessitate expansion of the City's water system to include new wells (and the opening of a new production field on BLM land approximately four miles northeast of the City), new ground level storage facilities and new water mains in the western, northern and eastern portions of the service area.

Other water systems in the area include community systems at Mesilla, Dona Ana and NMSU and eight private systems. Areas not served by these systems utilize private individual wells.

b. Wastewater Utilities. The City's wastewater utilities are described in detail in the facilities plan (Molzen-Corbin, 1981a). The system consists of a sewage treatment plant and a network of collection lines relying primarily on gravity flow. A brief summary of the system and specific problems which need to be addressed was presented in Section 4.1 of this EIS. Appendix A summarizes existing conditions of the plant and collection system.

c. On-site Wastewater Systems. There are an estimated 3,500 to 4,000 on-site wastewater systems (septic tanks, cesspools, etc.) in the planning area. This assumes one system for each of the residences/businesses which are

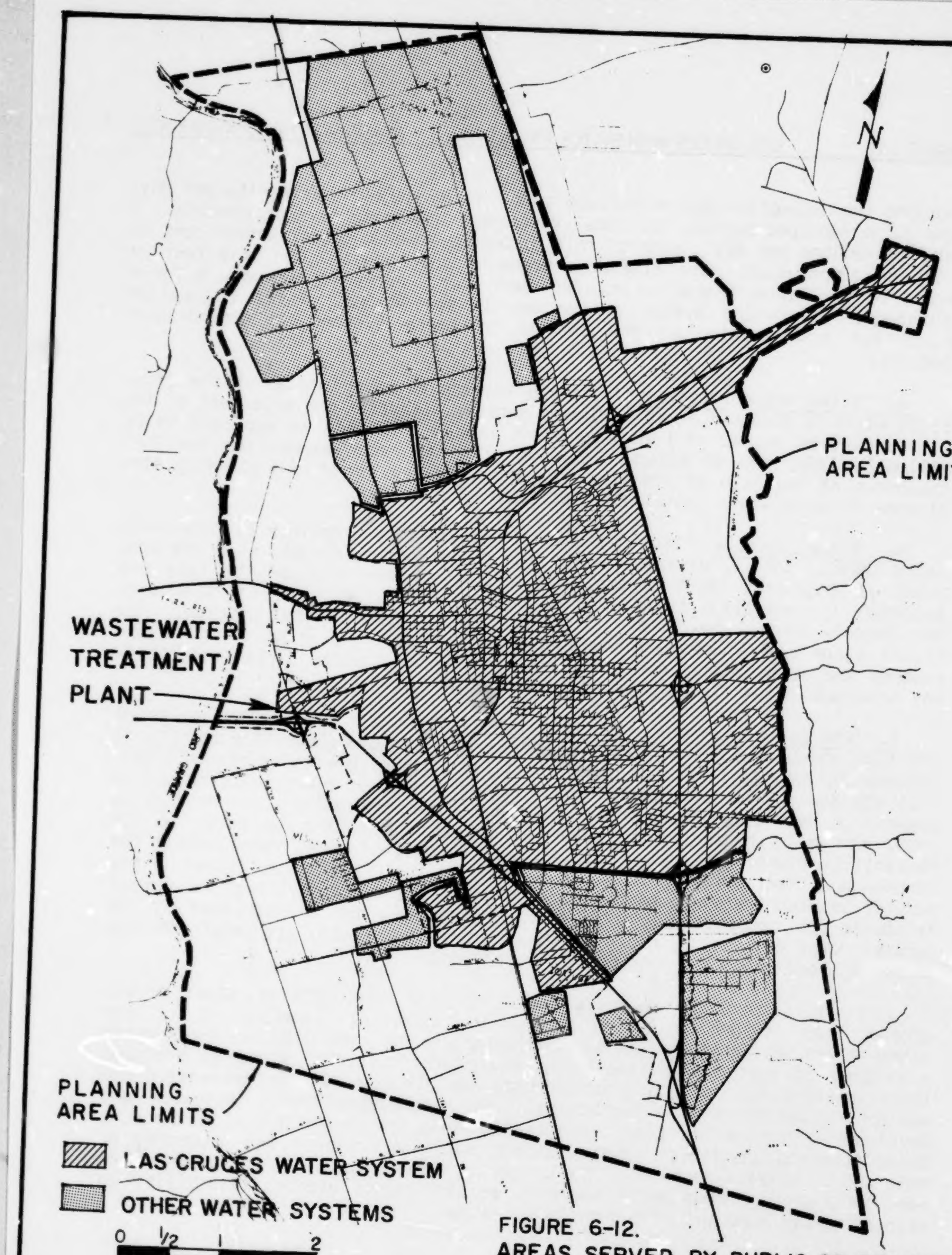

N
PLANNING AREA LIMITS
WASTEWATER TREATMENT PLANT
PLANNING AREA LIMITS
▨ LAS CRUCES WATER SYSTEM
▩ OTHER WATER SYSTEMS
0 1/2 1 2
GRAPHIC SCALE (miles)

FIGURE 6-12.
AREAS SERVED BY PUBLIC OR PRIVATE WATER SYSTEMS
Sources: DPEC, 1977; SEI, 1980.

outside the collection system service area. At 90 gallons per capita per day, and 3+ persons per system, the total wastewater discharge is approximately 1.2 million gallons per day. Most of this discharge reaches ground water; some is lost by evaporation. The discharge probably adds about 1,000 acre-feet of water to the valley's shallow aquifer each year. Refer to Appendix A for a discussion of on-site system regulations in New Mexico. Refer to section 6.2.2 for a discussion of the impacts of these systems on ground-water quality.

d. Solid Waste Management. Pickup service extends throughout the City. Solid waste is disposed of at a 40-acre sanitary landfill one mile east of the City limits on Bureau of Land Management land. This site is expected to be filled by 1985, and an adjacent 40-acre site has been leased from the BLM. Residents of the Town of Mesilla and the County portion of the planning area dispose of solid waste individually at County landfills.

e. Storm Drainage. Storm drainage is provided by a network of City-owned storm sewers, special diversion works and flood control structures. The Army Corps of Engineers flood control dam at the eastern edge of the City has successfully controlled flooding from the east. Local flooding of streets is now largely controlled by a continuing storm sewer extension program. The City's storm sewer lines and wastewater sewer lines are independent of one another and storm runoff does not pass through the treatment plant except as may occur as inflow through manholes during storms.

f. Energy and Communication Utilities. There are few buried cables of the type which would interfere with sewer line construction. Electricity is provided by El Paso Electric Company, utilizing three generating plants (coal, fuel oil and gas-fired respectively). Future growth of electricity demand is planned to be met by the Palo Verde Nuclear Plant, scheduled to be on line by 1983, and by a hydroelectric plant at Caballo Dam which is still in the feasibility planning stages. Natural gas is supplied by El Paso Natural Gas Company and distributed by a system managed by the City of Las Cruces. This service is also available to developments outside the City although many rural residents use propane fuel. The supply of natural gas is regulated by the Federal Power Commission, and allocations to the Las Cruces area must continue to be adjusted to ensure consistent future supply.

Gas and electricity dominate almost to the exclusion of other energy sources even though the area is in an excellent location to utilize alternatives, primarily geothermal and solar energy. The City has implemented a program of energy conservation in municipal facilities aimed at reducing traditional energy use (both natural gas and electricity) and increasing the use of non-traditional alternatives. An Alternative Energy Research and Development Program has been initiated by NMSU in conjunction with the N.M. Solar Research Institute. Most existing solar experiments are occurring at NMSU and in private ventures. The County is exploring geothermal potential to meet NMSU energy needs which would allow Las Cruces greater flexibility in allocating its supplies of conventional energy.

g. Transportation. Private vehicles are the dominant mode of transportation; others are intercity bus, rail freight, the general utility airport just west of Las Cruces, and the El Paso International Airport. Two interstate highways (I-25 and I-10) intersect just south of the NMSU campus and form a Y through the facility planning area, providing access to most major arterials within the City. Though no public transportation options are available, the City Planning Department recognizes the need for such alternatives to lessen dependency on the automobile and to promote desirable community growth (Las Cruces Planning Dept., 1980a). To date, however, transportation planning continues to focus on upgrading of existing streets and roads. The New Mexico Highway Department has proposed that a U.S. 70 bypass be located north of the City to carry traffic around the City between the two interstate highways. Alternatives to this route are being considered which would direct traffic through the southern part of town. The route selected could effect projected development patterns.

Capital Improvements. The City of Las Cruces is the only jurisdiction within the planning area which has developed a formal listing of future capital improvements (Table 6-12). Capital improvements are defined as major investments in fixed equipment or physical facilities required to operate and maintain the community infrastructure network. To date, the only comprehensive study updating and detailing capital improvements has been the Streets and Highways component shown as part of the Public Works line item in Table 6-12. The Recreation Department has a comprehensive study in progress and some bonds have been sold for improvements to the storm drainage system.

Land Use Policies and Plans. The City of Las Cruces adopted a Comprehensive Land Use Map in 1968 and has periodically updated that map for use by the Planning Department staff and Planning Commission. The City also has a comprehensive zoning code and subdivision regulations. The City Commission has final decision-making authority on all subdivision and zoning activity within the city limits and on subdivision activity within the five-mile planning and platting jurisdiction which, excluding the Town of Mesilla, encompasses the planning area.

TABLE 6-12. CITY OF LAS CRUCES CAPITAL IMPROVEMENTS BUDGET.

Type of Basic Service	1980/81	1981/82	1982/83	1983/84
Recreation	$ 174,652	$ 54,106	$ 1,260,353	$ 1,239,653
Public Works	8,512,700	4,607,700	8,848,200	12,952,700
Public Facilities	6,282,914	579,659	711,120	1,401,641
Community Facilities	897,493	4,037,493	1,257,330	22,757,734
Joint Utilities	4,386,450	1,163,450	13,331,950	518,750
Housing	834,666	834,666	834,667	834,666
Planning & Development	87,500	87,500	87,500	87,500
TOTAL	$21,176,375	$11,364,574	$26,331,120	$39,792,644

Source: Las Cruces Planning Department, 1978.

The City has no definitive time frame for preparing and adopting a Comprehensive Plan although work has progressed on several elements vital to the planning process: Streets and Highways, Recreation, and Annexation. Extraterritorial zoning has been studied in concept (Las Cruces Planning Dept., 1975) but not implemented. The community adopted an annexation plan in 1976 based on the projected 1990 Sewer Service Plan which had been adopted in 1975. The annexation plan is currently being revised and updated. As now formulated, it recommends that through 2005 annexation requests be accepted from areas to the north and west, to a limited extent to the south, and if growth warrants, to BLM land to the east. The boundaries as shown in the current version of the annexation study (October 1981) are somewhat larger than the projected growth and service area developed for this study, even though the wastewater facilities plan received city input and concurrence. The difference in boundaries presents a potential conflict. There is no official requirement that sewer service be provided to all incorporated areas. City policy needs to clearly identify the areas to be sewered. For environmental impacts to be as stated in this EIS, annexations must be confined to the service area now proposed, which encompasses the area where growth is expected. If growth should occur faster than expected and develoment within the proposed service area is largely complete, lines can be extended at that time to service areas further out. The interceptors now proposed will have sufficient capacity to handle the additional growth.

The Town of Mesilla prepared a Comprehensive Plan in 1974, components of which analyzed land use, housing, public utilities and community facilities. The plan itself was not formally adopted although a zoning ordinance based on that plan was; its use reflects the Town's policy of retaining the rural/traditional village, historical significance of the community by maintaining residential-agricultural zoning classifications. Guidelines for conservation of housing were prepared in 1979 by the Southern Rio Grande Council of Governments (SRGCOG) and further affirm the Town's policy of rehabilitating and preserving the local housing stock.

Dona Ana County, sponsored by SRGCOG, prepared a series of planning documents in the early 1970's, including elements on housing, land use and recreation. The only component formally adopted (Initial Land Use Statement, Policy Guidelines for the Southern Rio Grande Area) was updated in 1978 and adopted by the County Commission as part of the Dona Ana County Comprehensive Policy Plan. This policies plan was envisioned as the "initial component of the Comprehensive Master Plan to ensure rational development with respect to human, economic, and environmental needs within all areas of Dona Ana County" (DAC, 1978). The plan presents the County's goal on agricultural areas, namely, to preserve the economic viability of agricultural lands and operation within the County. To date, no further plans or land use ordinances have been completed to implement policy decisions expressed in 1978. The County adopted land subdivision regulations in 1973 to regulate the development of land; these controls are still in use.

6.6.2. Projected Population and Development Trends

The most important single environmental issue identified during the planning process involved the relationship of wastewater facilities and land use. The planning area is growing rapidly, with much of the development occurring on agricultural lands of the Mesilla Valley. Ideally, growth patterns are established by land use plans and policies which take many factors into consideration (including the cost of sewer service). Wastewater facilities are then designed according to the logic of the land use policies, and in particular sewer lines are located and sized in parallel with anticipated locations and magnitudes of urban growth. Under this ideal concept, the extension of sewer utilities becomes a tool for implementing the land use policy.

In Las Cruces, the ideal situation does not exist. There is no comprehensive plan for either the City or County. Instead, the development of a wastewater facilities plan, which contains proposals for extending sewers, will become a *de facto* land use plan. Areas which receive sewer service are likely to develop at a high density; those without the service are likely to develop at low density (unless subdividers are willing to pay for independent treatment plants). It is recognized that a sewer plan is *not* a land use plan, and it itself does not control development in the manner which can be accomplished by strong zoning and subdivision regulations. Still, there is no question that proposals for extending sewer lines into areas such as the Mesilla Valley would have a profound effect on the future development patterns of the area, with major, significant impacts on the human environment.

The planning process dealt with the growth issues in four steps. First, a detailed study was undertaken to project the probable development pattern for the planning area through the year 2005. Second, wastewater facility alternatives were developed to parallel the development pattern; specifically, collection service was proposed for those areas where higher density growth is anticipated. Third, the environmental implications of the development and service patterns were evaluated and subjected to extensive public review. Fourth, the alternatives were adjusted and chosen by the Applicant on the basis of various factors, including environmental impacts.

This section summarizes the first and third steps in the planning process. The second step is straightforward and is documented in section 5.2 and the facilities plan; the fourth was minor, because of minimal impacts as discussed in section 5.2. The information provided below is, in effect, an analysis of the major environmental impact of the entire facilities plan.

Population Projections. Population projections for the facility planning area are based on projections done for the New Mexico Environmental Improvement Division as an element of its 208 Water Quality Management Plan (NMWQCC, 1979). The original projections were prepared by the Bureau of Business and Economic Research (BBER) of the University of New Mexico in 1979, and were revised in 1980 to reflect preliminary census counts which indicated a smaller base line population than had previously been anticipated. The projections are summarized in Table 5-1; estimates for the year 2000 were extended to the year 2005 by a straight-line projection. The planning area is expected to contain 103,800 persons in 2005, which reflects a rapid growth rate of 73% over 25 years.

Substantial public input was received indicating that the area would grow faster than indicated by the projection. However, the perception of rapid growth is partly a reflection of a trend towards smaller households, increased consumption (e.g. more automobiles, telephones, etc. per person), and of the area's growth as a trade center. Past population projections have not been borne out by the 1979 and 1980 censuses. As a result, earlier projections have since been revised downwards.

The use of the 208 projections in wastewater planning is required by the EPA unless they are determined to be unrealistic. In this case, the projections are considered reasonable, especially since they are based on a sound methodology incorporating trends in population characteristics as well as local economic factors.

To disaggregate (distribute) projected population, the planning area was broken into sub-areas. The characteristics of each sub-area were analyzed through use of census data, inputs from community officials and developers, review of historic development patterns and plans, consideration of zoning, tabulation of vacant residential land, and other information. Based on this analysis each sub-area's share of the total projected population growth was determined. The results indicate the direction of current growth trends and are not intended to be precise, but rather are for use in long-range planning. Table 6-13 identifies the population projections for each of the sub-areas. Figure 6-13 shows the location of the sub-areas, and identifies the portions of the planning area where growth will be concentrated.

The projected growth can be summarized by defining three different development patterns or sectors.

1. Urbanizing fringe. Throughout the 25-year period the most rapid growth will occur on the periphery of Las Cruces, particularly to the north and east. Later in the period there will be increased development to the west-northwest. All told, approximately 65% of the projected growth will occur in the urbanizing fringe, which includes land now within the Las Cruces city limits as well as adjacent areas where annexation may occur.

2. Core area of Las Cruces. Although much development has occurred within the already-urban area of Las Cruces, there is much vacant land still available. Moderate, steady growth is projected for this area over the next 25 years. About 20% of the projected growth will occur through infill of the core area.

3. Outlying areas. Scattered development will occur in the remainder of the planning area, particularly to the north. Some of the development will occur as slow, steady growth in the existing communities of Dona Ana and

TABLE 6-13. POPULATION PROJECTIONS 1980-2005, LAS CRUCES WASTEWATER FACILITY PLANNING AREA.

	1980	1985	1990	1995	2000	2005	Population Change 1980-2005
FACILITY PLANNING AREA	59,900	68,700	77,900	86,800	95,200	103,800	43,900
POPULATION DISTRIBUTION AREAS:							
Core Area							
7	7,345	7,800	8,050	8,365	8,755	9,100	1,755
8	8,730	9,030	9,465	9,750	9,975	10,230	1,500
9	7,490	8,125	8,520	8,855	9,180	9,490	2,000
10	3,820	4,215	4,795	5,185	5,485	5,820	2,000
13	6,630	6,785	6,935	7,015	7,100	7,180	550
18	1,525	1,745	1,965	2,185	2,405	2,625	1,100
Core Area Subtotals	35,540	37,700	39,730	41,355	42,900	44,445	8,905
Urban Fringe							
1	500	1,135	1,635	2,170	2,565	2,780	2,280
2	0	1,785	3,965	6,090	6,590	7,135	7,135
3	3,615	4,450	4,985	5,515	5,760	5,900	2,285
4	5	125	235	350	465	575	570
5	330	445	560	675	790	900	570
6	4,090	4,090	4,090	4,170	4,400	4,660	570
11	1,620	2,335	3,000	3,665	4,095	4,475	2,855
12	1,575	2,075	2,680	3,280	4,140	5,000	3,425
14	1,345	1,635	1,920	2,205	2,490	2,775	1,430
15	815	1,045	1,825	2,585	3,420	3,960	3,145
16	320	475	625	875	1,275	2,030	1,710
17	1,325	1,425	1,530	1,780	2,175	3,035	1,710
C-1	330	510	680	850	1,020	1,190	860
Urban Fringe Subtotals	15,870	21,530	27,730	34,210	39,185	44,415	28,545
Outlying Area							
A-1	0	0	0	0	1,095	2,190	2,190
A-2	225	300	335	395	450	505	280
A-3	970	1,140	1,205	1,345	1,465	1,585	615
A-4	370	555	625	775	925	1,070	700
A-5	290	345	370	415	455	490	200
A-6	25	40	50	55	65	70	45
B-1	1,355	1,450	1,865	1,915	1,965	2,005	650
B-2	475	520	565	615	670	725	250
C-2	160	165	165	170	170	175	15
C-3	1,750	1,900	2,035	2,175	2,315	2,450	700
C-4	465	480	490	495	505	510	45
C-5	375	380	385	385	390	390	15
C-6	1,485	1,595	1,705	1,805	1,915	2,010	525
C-7	450	490	525	560	595	625	175
C-8	95	110	120	130	135	140	45
Outlying Area Subtotals	8,490	9,470	10,440	11,235	13,115	14,940	6,450
Total Facility Planning Area	59,900	68,700	77,900	86,800	95,200	103,800	43,900
City of Las Cruces 1/	45,086	54,710	63,210	71,235	77,305	83,270	38,184
Town of Mesilla 2/	2,029	2,080	2,230	2,365	2,510	2,635	606
Balance of Planning Area	12,785	11,910	12,460	13,200	15,385	17,895	5,110
Total Facility Planning Area	59,900	68,700	77,900	86,800	95,200	103,800	43,900
Total Service Area Population 3/	52,565	60,315	68,485	76,520	84,075	91,870 4/	39,305

1. Area within the existing corporate limits.
2. Portion within the existing corporate limits and also within the planning area.
3. See Figure 5-1; this includes areas 1-18, A-1, and C-6.
4. About 98% of this population is expected to be served by sewers.

Source: Lee Wilson and Associates, 1981b.

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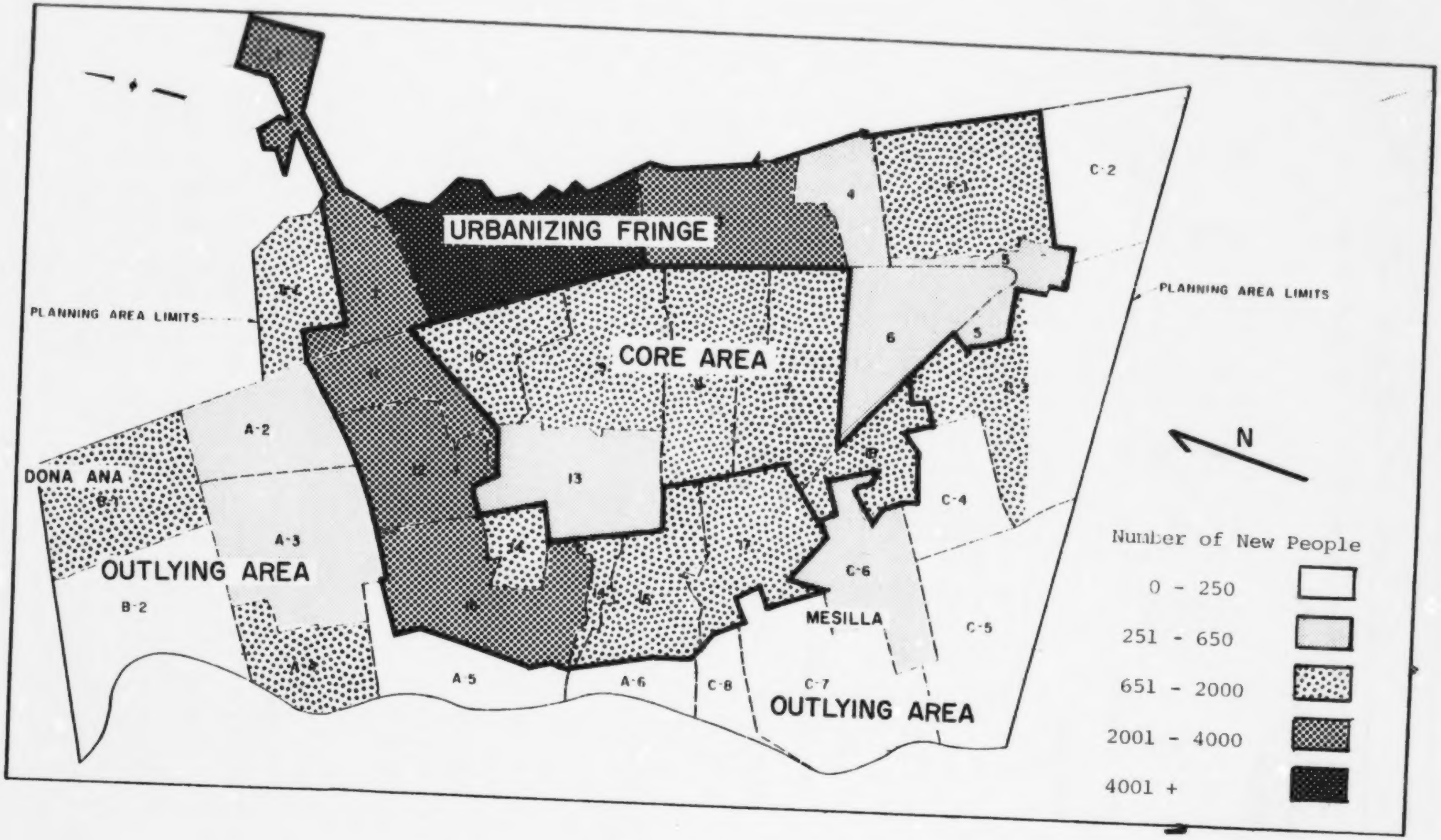

URBANIZING FRINGE
CORE AREA
OUTLYING AREA
OUTLYING AREA
PLANNING AREA LIMITS
PLANNING AREA LIMITS
DONA ANA
MESILLA
N
A-2
A-3
A-5
A-6
B-2
C-2
C-4
C-5
C-6
C-7
C-8
4
5
5
6
10
13
14
15
17
18
Number of New People
0 - 250
251 - 650
651 - 2000
2001 - 4000
4001 +

FIGURE 6-13. GROWTH AREAS, 1980-2005

Mesilla. The rest will be new subdivisions and individual homes in what are now largely rural settings. About 15% of the projected growth will occur in the outlying areas.

Projected Land Use. Translation of the projected population growth of 43,900 new residents into future land use patterns followed three steps. Proposed subdivisions were mapped, and it was assumed that they would be built. Next, within each population distribution area, it was determined how many people would not be accommodated by the proposed subdivisions. The third step was to identify where these additional people would locate. In Las Cruces, this decision was based on the presence of large, vacant residential tracts and their zoning. In other parts of the planning area, the future development pattern is more approximate. The amount of land required for the additional population based on past development trends in the population distribution area. However, the location of this growth within a given area can only be estimated roughly, and therefore generalized growth patterns have been indicated on the map; these designations do not indicate that specific parcels will be developed.

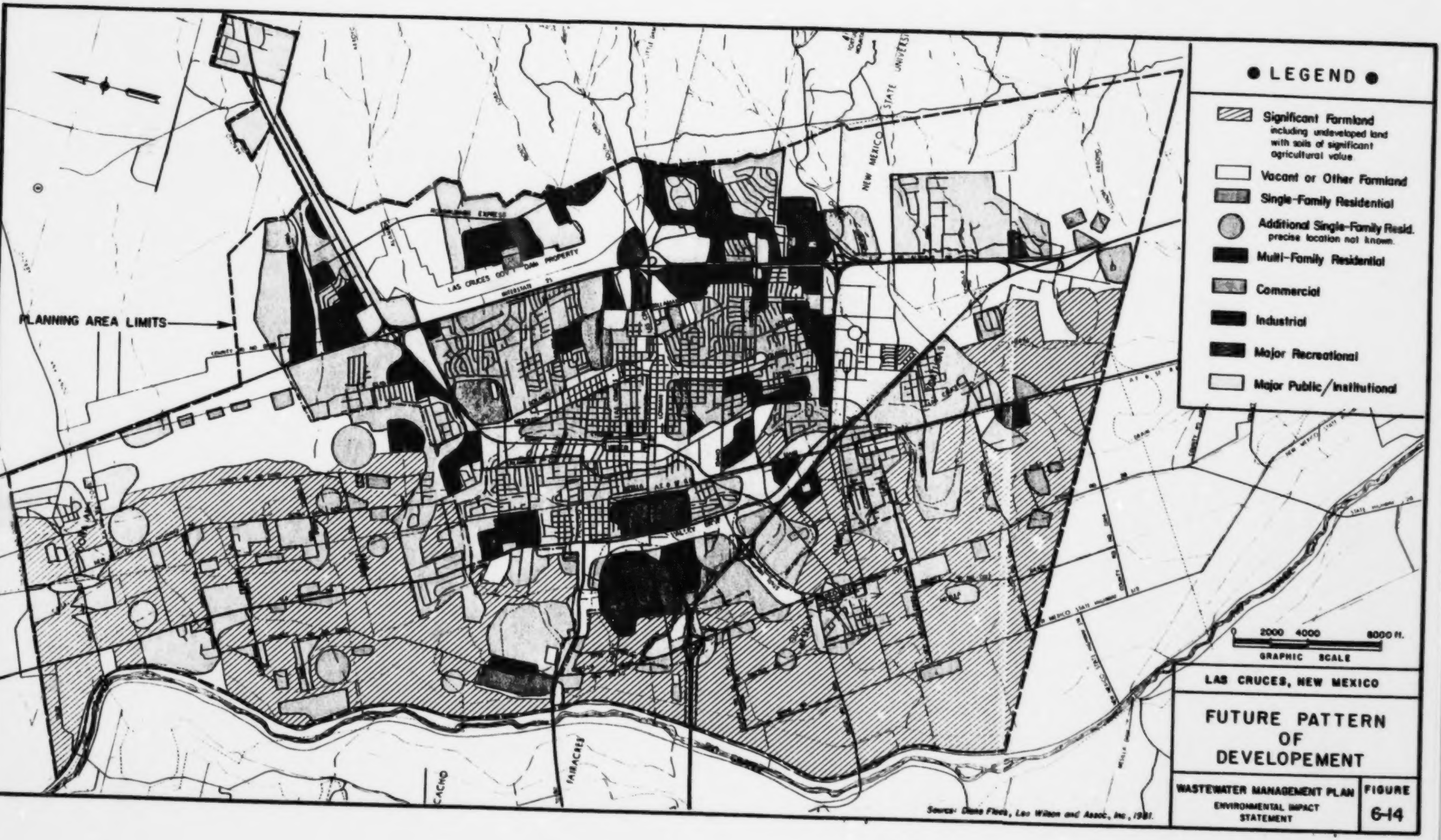
Although the methodology involves approximations, the resulting projection is considered to be a reasonable basis for determining the likely pattern of development, and the major impacts of that development. Figure 6-14 is a map depicting the projected development pattern in the planning area. The map can be compared to Figure 6-11, to identify areas of major change; the areas of change are also shown on Figure 6-13.

Most new residents will locate within and immediately adjacent to the City of Las Cruces. This growth will produce a relatively compact urban form, although some vacant tracts will remain within the urban area. Urban infill will occur west of Interstate 25 in both residential and commercial developments; residential development will also utilize vacant tracts east and west of Valley Drive. Areas of major new industrial development are located west of Valley Drive.

Major residential development is expected east of Interstate 25 and north to the existing city limits, utilizing non-agricultural lands for expansion. The extension of this pattern eastward could lead to use of the BLM land discussed in section 6.6.1.

Additional residential development will occur on tracts north and west of Las Cruces, adjacent to the existing city limits. Unlike the growth to the east, this growth will infringe on existing agricultural uses. There are also several developments planned in locations scattered throughout the "outlying" area. Again much of this growth will occur on farmlands.

While the population growth in the outlying area is only a small share of the total area growth (about 15%), it has a disproportionally large impact on future land use patterns. Since densities are much higher in urban areas than in rural areas (commonly 4-12 dwelling units/acre compared to 0.2-3.0 dwelling units/acre) it takes much less land to house the same number of people in the


● LEGEND ●
▨ Significant Farmland including undeveloped land with soils of significant agricultural value
☐ Vacant or Other Farmland
Single-Family Residential
○ Additional Single-Family Resid. precise location not known.
■ Multi-Family Residential
Commercial
■ Industrial
Major Recreational
☐ Major Public/Institutional
PLANNING AREA LIMITS
LAS CRUCES GOLF PROPERTY
INTERSTATE 25
NEW MEXICO STATE UNIVERSITY
FAIRACRES
CACHO
0 2000 4000 8000 ft.
GRAPHIC SCALE

LAS CRUCES, NEW MEXICO

FUTURE PATTERN OF DEVELOPEMENT

WASTEWATER MANAGEMENT PLAN
ENVIRONMENTAL IMPACT STATEMENT

FIGURE 6-14

Source: Dona Flora, Lee Wilson and Assoc., Inc., 1981.

city than it does in the country. All told, the land use pattern shown in Figure 6-14 would lead to conversion of approximately 2000 acres of agricultural land to urban use by the year 2005. Of this amount, 900 acres would be served by the expanded collection system and the remainder would be in scattered developments in which wastewater is disposed of on-site.

There are many ways in which the form of an urban area can impact the environment. In general, urban sprawl tends to: increase the rate at which land is urbanized; increase the costs of providing government services and facilities; and increase environmental stresses associated with traffic (energy use, air pollution). A relatively compact urban form, as shown in Figures 6-13 and 6-14, minimizes such impacts. The specific effects of the projected development pattern in Las Cruces are discussed in the following sub-sections.

Impacts on Environmentally Sensitive Agricultural Land. There is a definite potential for loss of farmlands by growth in the planning area. The urban land use pattern which would minimize such loss would be one which: a) is relatively compact, with most valley development occurring as infill to already urbanized sectors; and b) utilizes non-farmed land for much of the new development. As shown in Figure 6-13, this is largely the urban form which will result from the population and distribution patterns projected. The direct loss of agricultural land related to collection system expansion would be about 900 acres over the next 25 years. As discussed in section 6.2.4, the same acreage, or perhaps slightly more, would be lost even if there were no expansion of the wastewater service area, simply because the growth of Las Cruces will require the City to obtain and retire this amount of water-rights (irrigated) land. In addition to the 900 acres of farmland which would receive sewer service, another 1,100 acres would be urbanized in areas outside the service area, as subdivisions are developed using independent wastewater systems and on-site systems. The total long-term impact of the proposed wastewater management plan is thus to allow 2,000 acres of farmland to become developed.

The significance of this impact can be best understood by comparing it to the much more substantial impacts on Mesilla Valley farmland which have resulted from the rapid growth of the planning area in recent years. There have been conversions from agricultural to urban uses, fragmentation of agricultural parcels, increased land prices, and life style changes. Land was converted from agricultural to urban usage in the northern Mesilla Valley at an average annual rate of 280 acres between 1974-78 (Diemer, 1979). Continuation of the past trend would lead to conversion of 7000 acres (or more) by 2005, or three and one-half times the amount which should result from the projected development pattern and wastewater system.

Slowing down the rate at which farmland is urbanized has many benefits. As shown in Figure 6-11, fragmentation of irrigated land has been occurring, causing agricultural land to be separated from adjacent tracts by subdivisions, thereby creating parcels which are less economical and efficient to farm using modern commercial methods. In addition, urban sprawl into agricultural land causes life-style changes, as the predominantly rural/agricultural landscape is converted into a suburban one. The fields and green expanses originally sought by urban dwellers are divided into large house lots with lawns, isolated pecan trees, and vegetable gardens. Traffic, dust, and noise levels increase. With these changes in nature of the land, increasing numbers of wildlife, particularly birds and small mammals, leave the area. The farmer can no longer work in his fields at six in the morning without disturbing his neighbors; to fertilize his fields he must notify his neighbors ahead of time and avoid any potential harm to their property or health; the irrigation ditches which support the greenery become a threat to the lives of increasing numbers of young children. These and similar factors contribute to changing the character of the rural areas and the lifestyle of its inhabitants, and are to some extent avoided if the projected land use pattern becomes a reality.

Even though the Applicant's proposal minimizes the incentives for urbanization of farmland, in itself it does not ensure that the agricultural land will remain in production. The land is not only an environmentally sensitive resource deserving of protection, it is also an investment from which owners may wish to gain a higher economic return. Simple economics may force additional conversions. In 1974, farmland earmarked for development to the north of Las Cruces was selling for $3,000-4,000 an acre. In 1980, similar land was offered for $7,500-9,500 an acre. With the exception of pecan production (which offers financial returns greater than any other crop), these prices are higher than the farmer can realize when continuing to keep the land under cultivation. The value for land in continued agricultural production has not significantly changed during this time frame, ranging between $1,300-1,600 an acre (Supalla and Dragan, 1977; Diemer, 1980; and Bullok, 1980.)

Impacts on Infrastructure. Population growth adds to the demands on a community's infrastructure. Growth can cause increased traffic congestion and vehicle emissions as well as the need for new roads, schools, and expanded recreational areas. It can also increase the demand for energy resources and require staffing and equipment additions for police, fire and health-related services. A major concern is that the cost of providing these required infrastructure items be phased and coordinated in a manner which not only maximizes the use of public monies available for infrastructure expansion, but also enhances existing public investments.

The projected direction of growth - to the north and east - is in conformance with the many capital projects that have been planned and budgeted previously for these areas. The City, state and federal governments have already invested approximately $4,000,000 and have planned to allocate an additional $30 million in water, sewer, highway, school and flood control facilities to serve areas north and east of the City, as shown on Table 6-14.

In contrast, less than $3.25 million worth of public infrastructure expenditures is planned for projects located south and west of Las Cruces in areas where new growth is to be relatively limited. An estimated $250,000 may be used to construct a new Interstate 10 interchange 1.5 miles south of the

TABLE 6-14. PUBLIC INVESTMENTS NORTH & EAST OF CITY OF LAS CRUCES.

Investment	Existing	Planned
Dona Ana Water System		
City of Las Cruces East Mesa Water System	$ 400,000	$
Dona Ana Road	120,000	5,125,000
County Road CO-75 (Hopi Road)	200,000	
North Sewer Interceptor	500,000	900,000
North Loop Arterial		2,500,000
East-West County Roads in North Valley		4,000,000
Roadrunner Expressway		500,000
Elks Drive		2,500,000
Motel Boulevard Northerly Extension		1,030,000
Del Rey Boulevard		3,500,000
School Improvements	100,000	
Sandhill Arroyo Dam	2,700,000	5,000,000
		5,000,000
TOTALS	$4,020,000	$30,055,000

Source: Galves, 1980.

existing interchange. To the west, the City is considering investing approximately $3 million in utilities and roads to develop a municipal industrial park at the Las Cruces Airport (Galves, 1981).

Other Impacts. A compact urban form tends to minimize the need for vehicular travel, which reduces total emissions of air pollutants, results in less noise in rural areas, and conserves energy. Energy is also saved because of less investment in infrastructure (fewer major roads, sewer lines etc.). One way to measure the costs of sprawl (and the benefits of a compact urban form) is to compare the total community-wide energy costs of scattered development. In the extreme case, sprawl would result in all projected growth (43,900 people) locating outside the wastewater collection area (versus 30,000 of these people locating within the area as proposed by the City). Based on EPA (1978b), such a growth pattern would increase residential energy use by about 15%, due primarily to increased automobile travel and, secondarily, to increased residential energy use. Assuming this factor applies to the 30,000 people who would otherwise be part of a compact City, the extra energy use would amount to about 66 million kilowatt hours per year, or $4,000,000 per year (at 6 cents a kilowatt hour). Such a comparison is simplistic, especially since it considers only part of the costs of sprawl.

Summary of Impacts. The addition of 43,900 new residents over a 25-year period has potential adverse, long-term impacts. Almost doubling the existing resident population could mean an ultimate increase in agricultural land conversions, the need for utilities and community services, increased energy demands, and demands on local governmental units to achieve orderly and efficient growth.

The distribution of the projected population growth, as presented in this EIS, is the development pattern which creates the least adverse impact on the community with regard to preserving agricultural lands, protecting public infrastructure investments and controlling demand for energy by centralizing major activity in and adjacent to the City of Las Cruces. In order to achieve this logical and efficient pattern of growth, land use and development policies and regulations would need to be implemented and enforced by local governmental jurisdictions. Even with a good land use pattern, the growth itself will have many adverse, long-term impacts, including a large increase in the need to convert agricultural water rights to municipal water rights.

Given economic pressures, and the lack of a comprehensive plan for most of the area, there is no assurance that the past rate of farmland conversion would not continue, for example through subdivisions which use independent treatment facilities. To ensure a relatively compact urban form, and alleviate potential problems of sprawl, the City and County would need to make a concerted effort towards coordinated long-range comprehensive planning. The adoption of such plans, implemented and monitored with development controls such as zoning ordinances and subdivision regulations, is mandatory to guide the direction of growth to protect existing and planned public investments, and to minimize the effects of growth on farmlands.

6.6.3 Impacts of No Action Alternative

The No Action Alternative would avoid any socio-economic and land use change resulting directly from treatment plant actions, but could create a process which would encourage widespread uncontrolled growth on the prime agricultural lands of the Mesilla Valley. In particular, the adverse environmental effects of sprawl, described in section 6.6.2, would result from this alternative. If the municipal wastewater system cannot serve new development, then growth would probably occur outside the City, using independent wastewater plants or on-site systems. If all this development occurred in the Mesilla Valley, the amount of agricultural lands required under the No Action Alternative could exceed 7000 acres by the year 2005.

6.6.4 Impacts of Collection Alternatives

The proposed wastewater collection system supports a compact urban form, and has long-term environmental benefits as described in section 6.6.2. In particular, it reinforces a cost-effective development pattern which will minimize adverse impacts on agricultural land, while supporting other public investments. The alternative, of extending collection lines throughout the Mesilla Valley, would undoubtedly provide an incentive for continued sprawl of the urban area, with consequent impacts on agricultural land and urban infrastructure.

Elimination of odor problems at lift stations should reduce human distress in surrounding neighborhoods.

Sewer construction generally restricts traffic flow when lines are placed in street rights-of-way. Street closings commonly occur, especially during the excavation period. Adverse, short-term impacts resulting from traffic disruption include: inconvenience to those who use the affected street, especially if the street is used to provide access to homes or businesses; a temporary decline of business at commercial establishments; and increased noise and vehicle emissions on nearby streets which receive rerouted traffic.

When excavated trenches cross underground utilities, such as gas and water lines, it may be necessary to interrupt service for a brief period, or to relocate the other utilities. To minimize the effect of utility disruption, contractors are normally required to determine all utility locations along the sewer right-of-way, and to take steps to ensure coordination activity at the construction site. Only utility owners are permitted to undertake relocations.

6.6.5 Impacts of Treatment Alternatives

Alternatives with major land use impacts (e.g. new plant sites, land application) were eliminated during the screening stage. The existing land use at the treatment plant site would be maintained by the Applicant's preferred alternative and other treatment options. Continued discharge of effluent to the Rio Grande will be supportive of agricultural activities in the area.

Alternative 6 is well-suited for near-term implementation to bring the City into compliance with its NPDES permit. This would avoid the prospect of a hookup moratorium, and allow the City to accommodate orderly growth.

Elimination of odor problems at the treatment plant should reduce human distress in the surrounding areas.

6.6.6 Impact of Sludge Alternatives

The Applicant's preferred alternative would require use of about 104 acres of land for sludge injection and related activities. The proposed site is presently public lands (BLM) used for grazing. The long-term productivity of the land would be enhanced because of the organic matter and nutrients contained in the applied sludge. This land requirement does not occur from alternatives involving use of the existing landfill.

Alternatives involving landfill would have no impact on existing land use, since the sludge would be disposed at the exisitng City landfill.

6.6.7 Impacts of Other Alternatives

The alternative of a more aggressive approach to management of on-site systems (section 5.5.1) would add to administrative burdens on local governments. Alternatives to accomplish water conservation (section 5.5.5) will require passage of ordinances and appropriate enforcement by City staff.

Administrative alternatives (section 5.5.7) also require ordinance modification and enforcement.

Decisions made with respect to project funding (section 5.5.8) will determine who pays for the proposed improvements. Sewer charges could increase by as much as $360 per connection per year, which would substantially increase the utility costs for most residents. This increase can be reduced to the extent that EPA funding is obtained or the local share is obtained from methods other than sewer rates. Of course, all the money collected returns to the local, regional or national economy in the form of construction jobs, operational jobs, and the purchase of materials and energy.

6.6.8 Impacts of EPA Alternatives

The major adverse impacts on land use result from the growth of the area; the proposed actions minimize these impacts to the extent which is practicable in the absence of a comprehensive plan. EPA funding of these actions would be consistent with policy, which is to minimize adverse impacts on environmentally significant agricultural lands.

Construction impacts (such as disruption of traffic and utilities) are an inevitable result of taking steps to correct existing pollution problems and provide for orderly growth. EPA alternatives do not alter these impacts, except that the normal funding process provides an added level of review which helps ensure that mitigation measures such as listed in Table 5-6 are incorporated into construction contracts.

The major adverse long-term economic impact of the alternatives stems from the high total cost of the proposed facilities; these costs would be increased by selection of alternatives other than those preferred by the Applicant. EPA funding, if any, would reduce the local share of these costs and result in lower sewer rates.

6.7 ENERGY AND OTHER RESOURCES

6.7.1 Existing Conditions.

Excessive energy usage and costs are a major problem with the existing wastewater facilities. Figure 6-15 indicates that the total kilowatt hours used increased dramatically in 1975 after conversion of the plant from a trickling filter facility to one utilizing aerobic sludge digestion and an inefficient type of activated sludge. Energy costs in 1980 reached about $20,000 per month, plus an estimated $1400 per month for the six lift stations. In addition, there are other energy costs hidden in administration, maintenance, and in the supplies (principally chlorine) used to operate the system.

There are no other significant resources (except labor) needed to operate the current system. The principal material required is chlorine; this has

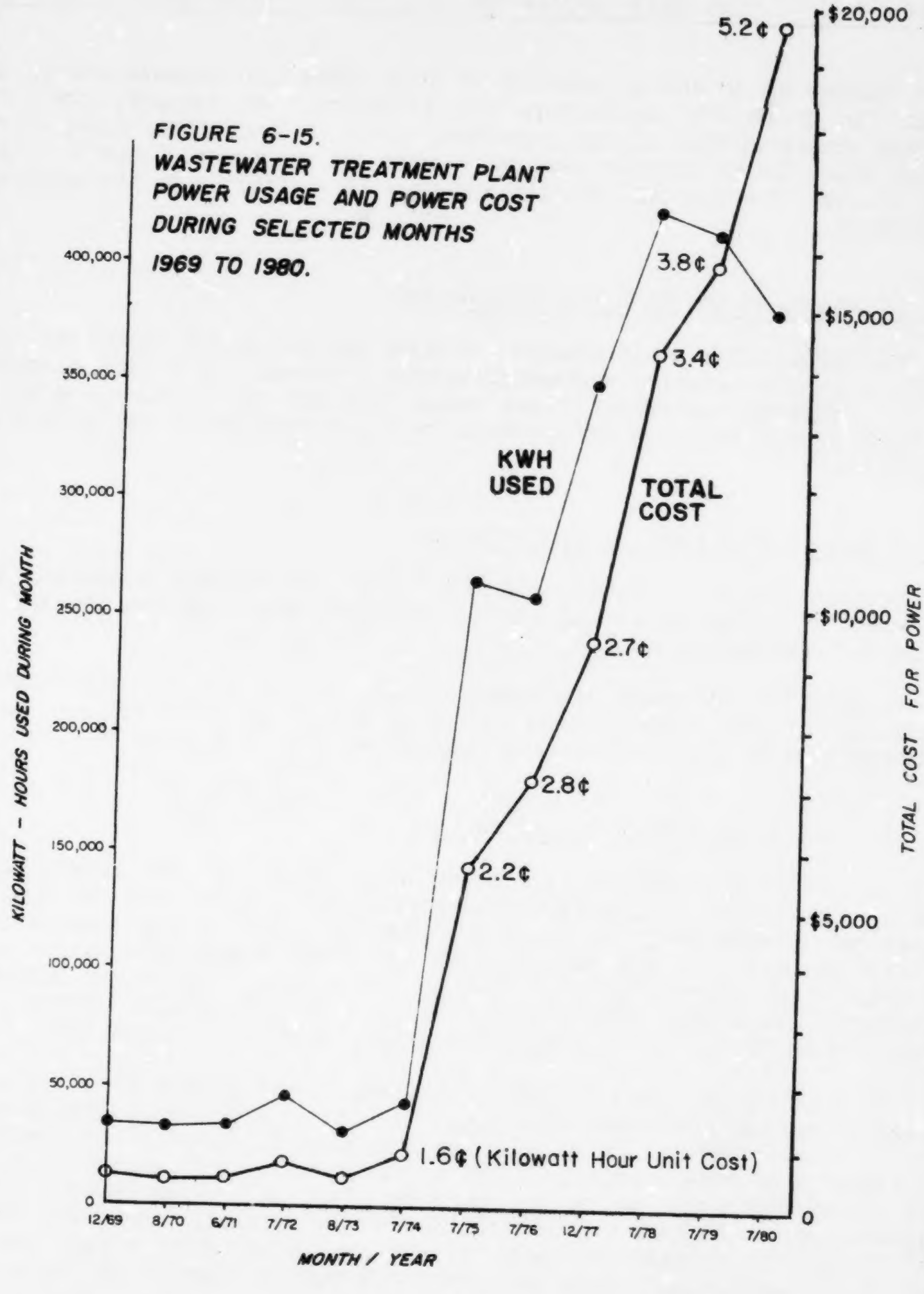


FIGURE 6-15.
WASTEWATER TREATMENT PLANT POWER USAGE AND POWER COST DURING SELECTED MONTHS 1969 TO 1980.

Source: Andrews, 1980.

been counted as an energy resource in this discussion because energy is the major factor in its manufacture and transport. At present, there is no methane recovered from sludge digestion. Grit is landfilled, along with that sludge which is not carried away by farmers and gardeners. Scum is processed with sludge. The disposal of grit and scum is unaffected by the alternatives considered.

6.7.2 Impacts of the No Action Alternative

This alternative would produce no major changes in the resources used and produced by the existing wastewater system. However, if a hookup moratorium is not imposed, wastewater flows would continue to increase, which would increase energy use. The effect would be a continuation of the curve shown in Figure 6-15.

6.7.3 Impacts of Collection Alternatives

Section 6.6.2 indicates that the land use pattern supported by the proposed collection system is energy-efficient, when compared to the sprawl which might otherwise result.

Because of increased wastewater flows, direct energy requirements for operation of the lift stations would increase to 0.39 million kw-hr/yr, somewhat greater than the existing requirement of 0.32 million kw-hr/yr.

6.7.4. Impacts of Treatment Alternatives

The rotating biological contactor alternative had the lowest operating energy requirement (2.8 million kw-hr/yr); next lowest was the Applicant's preferred alternative, the roughing filter/activated sludge combination (3.1 million kw-hr/yr, or 12% higher). The activated sludge alternative was only slightly more than this (3.2 million kw-hr/yr). The other alternatives considered had energy costs ranging from 3.8 to 5.5 million kw-hr/yr. These energy costs figured prominently in dollar costs of the alternatives.

In addition to operating energy, a wastewater system also represents a sizeable capital investment of energy. Energy is involved in the manufacture and delivery of construction materials, as well as directly in construction; an estimate of this energy is given in Table 6-15. The table includes values for operating energy use by the existing plant and by Applicant's preferred alternative. Note that the construction energy is quite large; when amortized it is probably at least as large as the annual operating energy use by the system. This capital energy investment has been considered in the evaluation of alternatives through dollar costs.

TABLE 6-15. ENERGY USE OF EXISTING AND PROPOSED FACILITIES

	Existing	Proposed (Design Year)
Lift Stations	0.32 million kw-hr/yr	0.39 million kw-hr/yr
Treatment Plant	4.5	3.1
Sludge Management	0.06	0.14 [1]
Chlorine [2]	0.15	0.28
Totals [3]	5.0 million kw-hr/yr	3.9 million kw-hr/yr
Energy Required to Construct New Facilities [4]		160 million kw-hr
Construction Energy Amortized Over 20 yrs		8 million kw-hr/yr
Construction Energy Amortized Over 40 yrs		4 million kw-hr/yr
Energy Credit from Digester Gas		2 million kw-hr/yr

1. This assumes that the heating requirements of anaerobic digestion can be met by waste heat from the cooling loop and exhaust of the methane-burning engine/generator system. The calculations of the facilities plan engineer indicate that this should (barely) be possible.

2. Energy involved in chlorine production. Assumes dosage of 8 mg/l; energy use of 1.3 kw-hr/lb.

3. Does not include energy involved in administration and maintenance, which will be relatively small.

4. Based on a figure of 22 kw-hr of primary energy required per 1963 heavy construction dollar (Roberts and Hagan, 1975). Construction costs have been corrected to 1981 figures with the Engineering News-Record construction cost index; primary energy (i.e. as mined: coal, crude oil, etc.) has been corrected to refined fuel energy by assuming a 7% loss in refining and transport to give an approximate value of 5.9 kw-hr per 1981 heavy construction dollar.

Source: Molzen-Corbin, 1981b; Roberts and Hagan, 1975.

6.7.5 Impacts of Sludge Alternatives

The four sludge management alternatives have widely differing energy impacts, reflecting the energy-intensiveness of the alternatives involving thermal conditioning and filter-pressing (1.2 and 1.5 million kw-hr/yr, respectively) versus the two alternatives involving anaerobic digestion (0.14 million kw-hr/yr for both alternatives). In addition, the anaerobic digestion options produce digester gas at a rate of 0.5 to 1.3 cubic feet per capita per day, having a heating value of about 650 Btu per cubic foot. This gives an energy credit of about 1.5 million kw-hr/yr as electricity and another 0.5 kw-hr/yr as excess heat which can be applied to the digesters.

The current resource value of sludge disposal would terminate if the Applicant's preferred alternative is adopted. The potential for more sophisticated types of reuse would be foregone, at least in the short-term. However, the option remains to recover the disposed sludge/soil mixture for use as a soil conditioner at some future time. In addition, direct reuse of sludge (e.g. on farmlands) is compatable with the proposed action, if allowed by regulations.

6.7.6. Impacts of Other Alternatives

Energy conservation measures, discussed in section 5.5.3, are intended to reduce the energy required for operation of the facilities, and to increase the fraction of the electricity needed by the sewage works that can be provided by digester gas. The remaining alternatives discussed in section 5.5. have no direct effects on resource use.

6.7.7 Impacts of EPA Alternatives

The alternatives available to EPA have no direct effect on resource use or production, unless the agency determines that the options considered are not cost-effective.

6.8 SUMMARY OF ADVERSE IMPACTS, ENVIRONMENTAL TRADEOFFS AND RESOURCE COMMITMENTS

Table 6-16 summarizes the impacts of the Applicant's preferred alternative. Of major concern to EPA policies (Table 3-1) are impacts on sensitive resources, such as wetlands; flood plains; prime and unique farmland; aquifer recharge zones; historic and archaeological resources; and recreational and open space areas. Impacts on these resources are discussed as follows: wetlands, or riparian habitat, see section 6.4; flood plains, see section 6.2; archaeological and historic resources, see section 6.5; important farmlands, see section 6.6; aquifer recharge zones, see section 6.2; open space areas, see section 6.6.

6.8.1 Adverse Impacts Which Cannot be Avoided

Construction of new wastewater facilities will have adverse short-term impacts (see Table 5-5). While these effects can be mitigated (Table 5-6), they cannot be avoided if the City is to comply with its NPDES permit and provide for orderly growth. The development of the area will result in urbanization of up to 2,000 acres of environmentally significant agricultural land, of which 900 acres would be directly served by the sewer system. Even more conversions of farmland (7,000 acres) would occur if the proposed action is not undertaken. All of the adverse impacts would occur with or without EPA funding.

Solution of the wastewater problems of the area requires substantial investment of public funds, which at least partially will be paid from higher sewer rates. This investment of resources is a necessary step toward compliance with environmental standards, and cannot be avoided. EPA funding would reduce the economic burden on local residents.

TABLE 6-16. SUMMARY OF IMPACTS OF THE APPLICANT'S PREFERRED ALTERNATIVE.

Adverse Impacts are generally those which cannot be avoided except by the No Action Alternative; most of the adverse impacts can be mitigated.

In addition to impacts identified below, substantial short-term benefits are associated with construction jobs, expenditures.

ENVIRONMENTAL RESOURCE	SHORT-TERM ADVERSE IMPACTS	LONG-TERM ADVERSE IMPACTS	LONG-TERM BENEFITS
EARTH RESOURCES	Accelerated water erosion resulting from construction of facilities, especially where sewer lines lie in or cross an arroyo	Sludge injection site could experience increased wind erosion, metals build-up in soils	Improved soil properties at sludge injection site (possibly enabling ultimate recycling of soil)
WATER RESOURCES	Dewatering during construction could cause water-table lowering, odors, water-quality changes	Interceptor 230 is located in a flood hazard zone	Increased flows in Rio Grande due to greater wastewater discharge; all effluent will be recycled downstream Improved quality of the Rio Grande, due to enhanced quality of effluent
AIR & SOUND QUALITY	Equipment exhausts, dust and noise during construction	Small increase in emissions, noise at treatment plant	Reduced odors at lift stations, treatment plant
BIOLOGY	Temporary loss of vegetation and habitat at some construction sites, especially arroyos	Clearing of 40 acres at sludge injection site	Improved aquatic habitat in Rio Grande; produtivity and habitat value of sludge injection site ultimately improved
ARCHAEOLOGY & HISTORICAL RESOURCES	Impaired quality of visitor experience in historic zones during construction	Possible loss of archaeological resources at all new facilities; possible foundation damage to historic buildings	Improved quality of visitor experience due to reduction of odors from lift stations adjacent to La Mesilla Historical District
SOCIO-ECONOMICS AND LAND USE	Traffic and utility disruption along construction corridors; reduced access to businesses	104 acres of grazing land converted to use as solid waste disposal site Substantial increases in sewer rates	Collection system supports compact urban form which will minimize impacts on agricultural land while supporting public investments; compact urban form has many secondary benefits, such as reduced travel (hence less air pollution, energy use); less disruption of rural environment
ENERGY & OTHER RESOURCES	Utilization of energy and resources during construction	Wastewater treatment requires major commitments of funds, labor, energy, materials	Net reduction in per capita resource use for wastewater treatment; methane recycling recovers energy value of sludge

6.8.2 Short-term Uses of the Environment versus Long-term Productivity

Upgrading of the treatment facility would promote long-term productivity by improving the water quality and ecology of the Rio Grande. In turn, this would enhance use of the river for swimming, fishing, irrigation and other purposes. The proposed service area supports the protection of agricultural lands, and thus benefits the long-term production of fiber and foodstuffs in the planning area. EPA funding for the most cost-effective treatment alternative would contribute to the achievement of these benefits.

6.8.3 Irreversible and Irretrievable Commitments of Resources

Major categories of resources to be utilized by the proposed treatment and capacity alternatives were identified in section 6.7 and include energy, construction materials, labor and capital. These commitments are substantial, as is necessary if the pollution problem is to be solved. The commitments are largely irretrievable.

CHAPTER 7
COORDINATION

7. COORDINATION

7.1 PUBLIC PARTICIPATION PRIOR TO RELEASE OF THE DRAFT EIS

Scoping Meeting. The U.S. Environmental Protection Agency (EPA) held a formal scoping meeting in Las Cruces on July 31, 1980. Notice of the meeting was published on June 26, 1980. The meeting was conducted for the purpose of identifying issues for consideration in the Environmental Impact Statement. Section 7.2 discusses the issues raised at the Scoping Meeting and EPA's responses.

Citizens Advisory Committee. In order to maximize public input during the EIS process, a Citizens Advisory Committee (CAC) was formed. The Joint Powers sought a cross-section of citizens by soliciting membership through a newspaper story and letters to various agencies, groups and organizations. The CAC is comprised of persons in substantially equivalent numbers from the following categories: private citizens, public interest groups, public officials, and those with substantive economic interest in the project. A list of Committee members follows.

1. Public Officials

A.F. 'Hooky' Apodaca	Elephant Butte Irrigation District
Luitt K. Miller	Las Cruces School District
Stephen Sanchez	Southern Rio Grande Regional Council of Governments.

2. Economic Interests

John Clayshulte	Las Cruces Development Council
Sam Jennings	Board of Realtors
Jim White	Las Cruces Home Builders Association

3. Public Interest Organizations

Jane Allen	Amer. Assoc. of University Women
William Trego	Mesilla Valley 2000
Nancy White	Industrial Growth Awareness Group

4. Citizens

Pat Banegas	N.M. Water Development Corp.
Albert Johnson	Former Mayor of Las Cruces
Richard McCowan	Activist in recent lawsuit concerning lift station odor problems
Stan Smith	Businessman
Marianne Thaeler	Civic Organizations

The Committee was formally organized on July 10, 1980 and since that time has been continuously involved in the EIS process. The CAC has been the major vehicle for obtaining public input regarding wastewater management alternatives. The following specific public participation activities were accomplished.

1. Depositories for written information were established as follows:
   A. CAC Office, City Hall, Las Cruces;
   B. Branigan Memorial Library, Las Cruces.
   All minutes and other documents identified in this chapter are available at these depositories.

2. Key interests were identified and a mailing list established. The list, containing over 100 names, includes individuals, major sewer users, citizen groups, government organizations, and the local media. All those on the mailing list were sent fact sheets prepared for public meetings by the EIS consultant, as well as responsiveness summaries of the meetings prepared by the City's Public Participation Coordinator.

3. Early in the program a speakers bureau was established. The public participation coordinator or key city staff spoke to several organizations, including the Sierra Club, Kiwanis Club, and the Rotary Club.

4. A newsletter was established during the main part of the program in which the public participation coordinator notified CAC members and others of meetings, actions, etc.

5. Advertising and media coverage was extensive, especially for the three major public meetings held by the CAC. Each of the three formal meetings was advertised through a legal notice (45 days prior to the meeting). Display ads were purchased in the local daily and weekly newspapers. News releases were issued as well as public service announcements to radio stations and designated local daily newspapers. Posters were printed and placed at key places such as public buildings in Las Cruces, Mesilla, and on the New Mexico State University campus. The local media ran news items on upcoming meetings and on two occasions, radio stations broadcast in-depth interviews with persons involved in the project. The local media also was informed of all CAC and Steering Committee meetings, and news releases were issued as various documents became available.

6. Between August 2, 1979, and August 13, 1981 a total of 32 meetings were held in connection with the planning process, at major decision points and at many intermediate points. Public comments and inputs were received througout this period.

7. The first public meeting held by the CAC took place on January 7, 1981. The consultants presented the results of the on-going planning work, with emphasis on the existing wastewater problems in Las Cruces

and the major issues influencing the solution of these problems. As for all public meetings, the responsiveness summary is available in the depositories cited above (item 1).

8. On March 19, 1981, there was a second public meeting held by the CAC. This dealt with the initial evaluation (screening) of alternative collection and treatment facilities and the environmental impacts of these alternatives.

9. The third CAC public meeting was held on July 30, 1981, and considered the detailed evaluation of alternatives related to the collection system, lift stations, treatment processes, and sludge management options.

The major issues considered by the CAC are discussed in section 7.2.

Other Meetings. Public input on the project began as early as August 1979 when the City of Las Cruces held a public meeting to discuss the application being submitted to EPA for the preparation of a comprehensive wastewater facilities plan for the area. The City purchased legal advertisements in the local newspapers as well as display ads. Posters were distributed at various places around the City and the matter was also well publicized in the local media. Subsequently, publicity surrounded formation of the Steering Committee, and public meetings held for the passage of a Joint Powers resolution by the City of Las Cruces, Dona Ana County, Town of Mesilla, and New Mexico State University.

Immediately following the EPA scoping meeting on July 31, 1980, the City of Las Cruces held a public meeting. The purpose of the meeting was to present results of the industrial pretreatment survey prepared by the facilities planning engineer.

7.2 ISSUES AND THEIR DISPOSITION

Major areas of concern raised at the scoping meeting included: the effect of plant site location on the current development pattern of the area; the secondary effect of increased plant capacity on prime agricultural land in the area; and the effect of increased plant growth and land use. These issues were included in the CAC evaluations discussed in the next paragraph.

Table 7-1 lists the major issues addressed by the CAC during their many meetings, and indicates the response to each.

7.3 ON-GOING COORDINATION

EIS Review. Table 7-2 lists agencies and organizations to whom the Draft EIS has been distributed. In addition to these agencies and organizations

TABLE 7-1. ISSUES IDENTIFIED BY THE CITIZENS ADVISORY COMMITTEE.

The CAC identified the following issues during its meetings.

1. Issue. Do planning area boundaries extend sufficiently far to encompass all areas where sewer service is needed?

   Response. See discussion in Section 5.2.1. Service may need to be extended to federal land east of planning area prior to end of planning period (year 2005). Proposed interceptors (Figure 5-3) allow for such extensions.

2. Issue. Is projected population in planning area sufficiently large, or will Las Cruces actually grow much faster?

   Response. See Section 6.6.2 The projection is established by the State and not easily changed; it appears to be reasonable and in fact reflects an extremely rapid growth rate. At worst, if growth is more rapid than indicated, the proposed facilities will reach capacity somewhat before the year 2005.

3. Issue. Does the projected distribution of population reflect a reasonable outlook as to the development patterns in Las Cruces?

   Response. See section 6.6.2. After considerable debate, the consensus was that the projections are reasonable. In particular, the projections correspond to patterns of public investments and facilities.

4. Issue. Should the service area boundary be extended further into the Mesilla Valley, especially northward?

   Response. See Section 5.2.2. After extensive debate, the proposed service area boundary was considered appropriate. The protection of prime farmland was a major factor favoring a limited expansion of the service area.

5. Issue. Should the treatment plant location be changed (or a second site developed)?

   Response. See Section 5.3.3. All alternatives for relocating the facility were found to substantially increase costs.

6. Issue. Which of the treatment and sludge management processes are best for Las Cruces?

   Response. See Section 5.3.3. Based on dollar costs and flexibility, alternative 6 has been selected for wastewater treatment and alternative 1 for sludge management.

7. Issue. Is land application feasible?

   Response. See section 5.3.2. This alternative was found to be not cost-effective because of the large land area and special cropping requirements.

8. Issue. Should cogeneration or other innovative alternatives be adopted?

   Response. The facilities plan concluded that none of the innovative alternatives studied would be appropriate in Las Cruces.

9. Issue. The new facilities should maximize energy efficiency.

   Response. See section 5.5.3. This objective has been met throughout the selection process, as for example, by the recycling of methane gas.

10. Issue. What can be done to solve the immediate problems of plant non-compliance?

    Response. The selected alternatives are those most readily suited to solving the compliance problem, even in the absence of federal funding.

11. Issue. Should Las Cruces fund the facilities on its own, without EPA assistance?

    Response. See section 5.5.8. This may be desirable or even necessary, but so far the City has decided to continue with the federal funding process.

TABLE 7-2. COORDINATION

Listed below are governmental or public-interest groups which will receive a copy of the EIS; in addition over 100 other groups and individuals will receive a copy of the Draft EIS. An asterisk (*) indicates agencies or groups with which coordination took place during the planning process.

Federal

Farmers Home Administration
* Soil Conservation Service
U.S. Dept. of Interior
U.S. Dept. of Commerce
U.S. Dept. of Transportation
Federal Aviation Admin.
Federal Highway Admin.
U.S. Dept. of Agriculture
Water Resources Council
Agriculture Stabilization and Conservation Service
U.S. Dept. of Energy
Federal Energy Regulatory Comm.
Advisory Council on Historic Preservation
U.S. Dept. of Housing and Urban Development
U.S. Public Health Service
U.S. Dept. of Health and Human Services
National Park Service, SW Region
Economic Development Admin.
* U.S. Corps of Engineers
* U.S. Fish & Wildlife Service
Bureau of Indian Affairs
* Bureau of Reclamation
USGS, Water Resources Division
Indian Health Service
* Bureau of Land Management
Hon. Pete V. Domenici, U.S. Senator
Hon. Harrison Schmitt, U.S. Senator
Hon. Joe Skeen, U.S. Representative
U.S. Bureau of Mines
Interagency Arch. Services/NPS
Federal Emergency Mgmt. Agency
International Boundary and Water Commission

State

* Environmental Improvement Division
State Health Agency
State Planning Officer
* Dept. of Game & Fish
* State Engineer
NM Natural Resources Cons. Comm.
Parks & Recreation Commission
NM Dept. of Agriculture
* NM Travel and Tourism Division
* State Highway Department
* NM Dept. of Health and Environment
Forestry Division/Land Office
Governor's Office
* Historic Preservation Officer
* Museum of NM
NM Farm and Livestock Bureau
NM Natural Resources Dept.
Energy & Minerals Dept.
State Land Office
Bureau of Mines & Mineral Resources

Local

City of Las Cruces
Town of Mesilla
County of Dona Ana
South Rio Grande Council of Governments
NM State University

Public Interest Groups

Environmental Health Assn.
NM Citizens for Clean Air & Water
NM Wildlife Federation
NM Lung Assn.
NM Conservation Coordinating Council
Sierra Club
Wildlife Society
NM Wilderness Study Commission
Izaac Walton League
National Audubon Society
The Wilderness Society
Environmental Defense Fund
League of Women Voters
American Citizens Together
SW Research Information Center
Conservation Action League
Wildlife Mgmt. Inst.
Friends of the Earth
Nat'l Council of Pub. Land Users
NM Historical Society
Trout Unlimited
Continental Forest Ind.
Am. Assoc. Univ. Women
T. Baker Smith & Son
Amer. Wilderness Alliance
Nat. Wetlands Tech. Council
Nat. Resources Defense Council

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listed, a total of 100 interested citizens, including those on the CAC and Steering Committee, also received the Draft EIS.

Public notices of the availability of this Draft EIS and of a public hearing on the document and the related facilities plan will appear in the Federal Register and local newspapers. The Draft EIS also will be available for review at the following locations:

1. City Hall, Las Cruces, New Mexico.
2. Branigan Memorial Library, Las Cruces, New Mexico
3. New Mexico Environmental Improvement Division, 725 St. Michaels Drive, Santa Fe, New Mexico.

Copies of the Draft EIS can be obtained from:

David Oakeley, Public Participation Coordinator
City of Las Cruces
P.O. Drawer CLC
Las Cruces, New Mexico 88001
Telephone (505) 526-0317 or

Clinton B. Spotts, Regional EIS Coordinator
U.S. Environmental Protection Agency, Region VI
1201 Elm Street
Dallas, Texas 75270
Telephone (214) 767-2717

The draft facilities plan will be released at approximately the same time as the Draft EIS and will be made available at each of the above locations. The public hearing on the Draft EIS will encompass the draft facilities plan.

Other Coordination. Appendix C contains replies to letters requesting cooperation in the writing of this EIS and requesting coordination with the proposed action, a letter from the Project Engineer regarding the Sludge Disposal Site, and a floodplains construction notice in compliance with Executive Order 11988.

CHAPTER 8
LIST OF PREPARERS

8. LIST OF PREPARERS

Name	Education	Responsibility
	Environmental Protection Agency	
Clinton B. Spotts	B.S., Agricultural Education	Regional EIS coordinator
Stuart Gray	B.S., Civil Engineering	Project engineer, Municipal Facilities branch
David Neleigh	M.S., Environmental Engineering	Chief, Oklahoma-New Mexico section, Municipal Facilities branch
Elaine Pickle	B.S., Business Administration	Las Cruces EIS public participation
Norm Thomas	B.S., Chemistry	Chief, EIS preparation section
	Lee Wilson and Associates, Inc.	
Lee Wilson	Ph.D., Geology	Project director; alternatives; water resources
Stevan Anderson Senior Environmental Scientist	M.A., Geography	All sections; physical environmental; alternatives; impacts; graphics supervision
Ann Claassen Enviromental Scientist	B.S., Chemistry	Water resources, impacts; air quality, energy and other resources; biology; non-point sources
Diane Flock Environmental Scientist	B.A., Geography	Population, land use, socio-economics; capacity alternatives

Marilyn Forrest Administrative Staff	M.A., Education	Word processing
David Hawkins	B.A. Anthropology B.S. Geology M.S. Hydrology	Archaeology, geology, hydrology
Elizabeth Hayden		Graphics
Greg Mello	B.S., Engineering M.A., City and Regional Planning	Energy; Editing
Eliza Niederman	A.B., Government	Public Participation
Sally Rodgers Administrative Staff		Editing
Richard Smartt	Ph.D., Zoology M.S., Zoology B.A., Zoology	Biology
Priscilla Visarraga Administrative Staff		Word processing

Mimbres and Associates

Karen Lyncoln	B.A., Urban Studies	Socio-economics; land use

City of Las Cruces

David Oakley	B.A., Jounalism and Mass Communications	Public Participation

CHAPTER 9
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9. BIBLIOGRAPHY

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CHAPTER 10
GLOSSARY

10. GLOSSARY

10.1 COMMON ABBREVIATIONS (ACRONYMS)

AF	Acre-feet
AFY	Acre-feet per year
BBER	Bureau of Business and Economic Research
BLM	Bureau of Land Management (U.S.)
BOD	Biochemical oxygen demand
CAC	Citizens Advisory Committee
cfs	Cubic feet per second
CO	Carbon Monoxide Levels
COD	Chemical oxygen demand
CWA	Clean Water Act
DO	Dissolved oxygen
DPECP	(Las Cruces) Dept. of Planning and Enviromental Control
DU	Dwelling Unit
EBID	Elephant Butte Irrigation District
EIB	Environmental Improvement Board
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency (U.S.)
gpcd	Gallons per Capita per Day
ISC	Interstate Stream Commission
kwh	Kilowatt hours
mgd	Million gallons per day
mg/l	Milligrams per liter
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NMEID	(New Mexico) Environmental Improvement Division
NMSU	New Mexico State University
NMWQCC	New Mexico Water Quality Control Commission
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OSHA	Office of Safety and Health Administration
OSS	On-site system
RBC	Rotating Biological Contractors
SCS	Soil Conservation Service (U.S.)
SRGCOG	Southern Rio Grande Council of Governments
STORET	Computerized Data Base operated by U.S. EPA
TDS	Total dissolved solids
TOC	Total organic carbon
TSS	Total suspended solids
TSP	Total Suspended Particulate Levels
USBC	U.S. Bureau of the Census
USDI	U.S. Department of Interior
USGS	U.S. Geological Survey
WRD	Water Resources Division
WPRS	Water and Power Resources Service (now U.S. Bureau of Reclamation)
WSMR	White Sands Missile Range
WTCOG	West Texas Council of Governments

10.2 TECHNICAL TERMS

Acre-foot. 1 acre-foot is the amount of water which covers one acre to a depth of one foot.

Acre-foot per year. Equals 325,851 gallons or 43,560 cubic feet; this unit is used to quantify amounts of water rights.

Activated sludge. See extended aeration.

Advanced secondary treatment. Treatment more stringent than secondary treatment but not to advanced waste treatment levels (see definitions of secondary treatment and advanced waste treatment).

Advanced waste treatment. Treatment providing for discharges with BOD and TSS of less than 10 mg/l (each) and/or total nitrogen removal of greater than 50 percent.

Advisory Council on Historic Preservation. An independent executive agency empowered to comment upon all undertakings licensed, assisted or carried out by the Federal government that have an effect upon properties in the National Register.

Aerobic/anaerobic microorganisms. Microorganisms that either thrive on air (aerobic) or do not (anaerobic). Aerobic bacteria are more efficient at consuming organic matter while anaerobic bacteria produce humus and gases, such as methane.

Aeration. The process which brings about contact between air and water by natural or mechanical means such as spray, bubbling, or agitation.

Aerated lagoon. A method of treating sewage by placing it into a lagoon and introducing mechanical aeration. The oxygen supports microorganisms feeding on the organic matter in the sewage, and at a more intense level than would occur naturally.

Aquaculture. A wastewater treatment process in which aquatic organisms remove and utilize the organic matter in the wastewater.

Aquifer. An underground layer of permeable material that will yield sufficient water to be considered as a source of water supplies.

Basal area. The area occupied by timber in square-feet per acre.

Biochemical oxygen demand (BOD). The oxygen demand of a sample of water is the amount of elemental oxygen required to react with oxidizable or biodegradable material dissolved or suspended in the sample. When the agency through which the oxidation is affected is a population of bacteria, the oxygen required is called the biochemical oxygen demand (BOD). BOD tests are usually run for 5 days, hence BOD_5. BOD load is the pollutant content of a body of water, usually expressed in pounds of oxygen required to break down the pollutants.

Black wastes or blackwater. Waste from a toilet or urinal or garbage disposal.

Chemical oxygen demand (COD). (See BOD). A quick (and only approximate) measure of loads of oxidizable matter in water (in milligrams per liter) in which a strong oxidizing agent is used instead of microbial life. Like BOD, COD is an oxygen demand parameter; however, results cannot be used interchangeably with BOD values. COD can quickly identify water with very low or very high BOD potential.

Chlorination. The application of chlorine to water or wastewater, generally for the purpose of disinfection, but frequently for accomplishing chemical results, such as oxidation of odor-producing compounds.

Chlorine residual. Chlorine remaining in water or wastewater at the end of a specified contact period as combined or free chlorine.

Clarifiers. Mechanical devices for removal by gravity (settling out) of suspended particles in a liquid such as sewage.

Cogeneration. Refers to a sludge disposal option, in which sludge is mixed with municipal refuse and incinerated; the energy thus produced is recovered (e.g. as steam).

Collection system. Pipelines or conduits, pumping stations, force mains, and all other devices, appurtenances and facilities used for collecting and conducting waste to a point of treatment and disposal.

Composting. A sludge stabilization method involving biological oxidation of the sludge by thermophilic (heat-loving) organisms. High temperatures are created in the process, thus the compost product is nearly sterile.

Comprehensive Land Use Plan. A long range comprehensive plan looking to the future growth and development of an area and seeking to project a concept under which the community may be developed in an orderly and desirable fashion.

Conductivity. The ability to carry an electrical charge, in ions. The conductivity of aqueous solutions is increased by dissolved salts and thus is a measure of the amount of ionized salts in solution.

Consumption. The amount of diversion of water not consumed, but returned back to the stream; also called discharge.

Critical Habitat. Any land, air or water area including any elements thereof which the Secretary of Interior under the provisions of the Endangered Species Act has determined is essential to the survival of wild populations of a species listed as endangered or threatened or to its recovery to a point at which it needs no longer be protected.

Cubic feet per second (cfs). Units used to measure flow at a gaging station; equals the rate of flow in a channel with a one-square-foot cross-section and velocity of one foot per second. One cfs for a 24-hour period equals 86,4000 cubic feet or 1.98 acre-feet.

Dewatering. A process which removes enough of the water from sludge so that it behaves as a solid (greater than 15% solids).

Digester. In a wastewater treatment plant, a closed tank that decreases the volume of solids and stabilizes raw sludge by bacterial action.

Discharge volume. The quantity of liquid flowing per unit of time in a stream channel, conduit, or orifice at a given point.

Discharge plan. A description of methods and conditions, including any monitoring and sampling requirements, for the discharge of effluent or leachate which may move directly or indirectly to surface or ground water.

Dissolved air flotation. A process for thickening of sludge. Pressurized air is fed into the sludge from below; air bubbles attach to sludge particles and buoy them to the surface where they are scraped off as thickened sludge. Used primarily with waste activated sludge; produces a sludge with 4 to 8% solids.

Dissolved oxygen (DO). DO concentration of unpolluted water depends primarily on atmospheric pressure and temperature. Therefore, it is greater at sea level and when water is cool than at high altitudes or when water is warm. In the course of breaking down excess organic matter in water, microbes may deplete the oxygen causing stress from lack of oxygen on fish and other aquatic life. In extreme depletion, water may become anaerobic (literally without air) stagnate, and stink.

Diversions. The amount of water taken from a stream (or spring, well); also called withdrawals.

Effluent. Wastewater or other liquid, partially or completely treated, flowing out of a reservoir, basin, treatment plant, or part thereof.

Effluent limitation. Means any restriction established by a state or EPA on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean.

Endangered Species. Any species which the Secretary of Interior has designated as being in danger of extinction throughout all or a signigicant portion of its range other than a species of the class insecta determined by the Secretary of Interior to constitute a pest whose protection would present overwhelming and overriding risk to man.

Environmental Impact Statement (EIS). A report prepared by EPA, which identifies and analyzes in detail the environmental impacts of a proposed EPA action and feasible alternatives. Under the National Environmental Policy Act (NEPA), the report is required for all major Federal projects that will have a significant effect on the quality of the human environment.

Extended aeration. A method of treating sewage involving 24 hours of mechanical aeration in a tank to introduce oxygen and support anaerobic bacteria feeding on the organic matter in the sewage. In the subsequent settling stage, the mass of bacteria drop out to form a sludge. A portion of this "activated" sludge is recycled for treatment of fresh sewage.

Facilities Plan. Preliminary plan prepared by the grantee as the basis for construction of publicly owned treatment works. Specific requirements for these plans appear in 40 CFR S35.917 (1977).

Fecal coliforms. A large and varied group of bacteria. The fecal coliform bacteria flourish in the intestines and feces of warm-blooded animals, including man. Escherichia coli (E. coli) is largely of fecal origin and has been the indicator organism most commonly cited as indicating sewage or feedlot pollution. The coliforms apparently do not themselves cause disease, but their presence in water suggests that disease-causing organisms (pathogens) may also be present. Coliform bacteria are used as indicators of pollution because they are abundant and their presence is fairly easy to detect. The coli-aerogenes group is also among indicator organisms and is not usually distinguished from other fecal coliforms. Enteric viruses are pathogens found in animal wastes. Methods for their identification in water remain provisional. The presence of fecal coliform bacteria suggests that pathogenic and viruses may be present--hence the concern over danger of bacterial infection whenever large numbers of fecal coliform bacteria are detected in water.

Force main. A pressure pipe joining the pump discharge at a water or wastewater pumping station with a point of gravity flow.

Greywater. Water-carried waste from the kitchen or bathroom sinks, showers, bathtubs, or washing machines; all household wastewater other than blackwater.

Grit. The heavier mineral matter, such as sand, gravel, etc., in water or sewage.

Ground water. Interstitial water which occurs in saturated earth material and which is capable of entering a well in sufficient amounts to be utilized as a water supply.

Impact. Any change, beneficial or detrimental, that is caused directly or indirectly, by the construction of a wastewater treatment facility.

Incineration. A sludge disposal option in which the sludge is burned in a furnace. Usually requires additional fuel.

Interceptor. Trunk line, usually at least 12" in diameter, which carries wastewater from smaller collection lines to the treatment plant.

Influent. Raw or partially treated wastewater flowing into a sewage treatment plant.

Lift station. A small wastewater pumping station that lifts the wastewater to a higher elevation when the continuance of the sewer at reasonable slopes would involve excessive depths of trench, or that raises wastewater from areas too low to drain into available sewers. These stations may be equipped with pneumatic ejectors or centrifugal pumps.

Milligrams per liter (mg/l). One part by weight of dissolved chemical, or suspended sediment, in 1 million parts by volume (= 1 liter) of water. See Part per million.

Million gallons per day (mgd). A unit of measurement for expressing the flow rate of sewage treated at a plant.

Monitoring. Periodic or continuous determination of the amount of pollutants present in the environment.

National Pollutant Discharge Elimination System (NPDES). Means the National permitting system authorized under section 402 of the Clean Water Act, including any state or interstate program which has been approved by the Administrator, in whole or in part, pursuant to Section 402.

National Register of Historic Places. A register of districts, sites, buildings, structures and objects significant in American history, architecture, archeology and culture maintained by the Secretary of Interior. The National Register is published in its entirety in the FEDERAL REGISTER each year in February. Addenda are published on the first Tuesday of each month.

National Environmental Policy Act of 1969 (NEPA). Federal law enacted to ensure that all Federal agencies include in the decision-making process appropriate and careful consideration of all environmental effects of proposed actions, explain potential environmental effects of proposed actions and their alternatives for public understanding, avoid or minimize adverse effects of proposed actions, and restore or enhance environmental quality as much as possible.

Nitrogen. See Nutrient.

Non-point source. A type of pollution that cannot be pinpointed to a specific source. Pollution whose source is general rather than specific in location.

Nutrient. An element or compound required by an organism for growth and/or sustenance. Commonly, when referring to water quality, "nutrient" specifically means phosphorus and nitrogen.

On-site system (OSS). Individual facilities for treatment and disposal of wastewater, as opposed to a public wastewater treatment facility.

Oxidation lagoon. A process for the prolonged detention of sewage in shallow ponds. Natural (as opposed to mechanically induced) contact with air is designed to support aerobic microorganisms which digest sewage.

Oxidation process. Any method of wastewater treatment for the oxidation of the putrescible organic matter. The usual methods are bioligical filtration and the activated sludge process.

Oxidation treatment. The process whereby, through the agency of living organisms in the presence of oxygen, the organic matter contained in wastewater is converted into a more stable or mineral form.

Oxidation tower. A verticle trickling felter, where synthetic media are encased in a tower and effluent trickles down from the top.

Part per million (ppm). One part by weight of dissolved chemical, or suspended sediment, in 1 million parts by weight of water. Roughly equivalent to milligrams per liter (mg/l) between 0 and about 7,000 ppm.

pH. Measure of hydrogen-ion activity in solution. Expressed on a scale of 0 (highly acid) to 14 (highly basic). pH 7.0 is a neutral solution, neither acid nor basic.

Phosphorus. See Nutrient.

Point source. Any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, or vessel or other floating craft, from which pollutants are or may be discharged.

Primary treatment. The physical treatment of sewage, such as by sedimentation (settling out of solid material), screening, etc.

Recharge Areas. An area in which water is absorbed and eventually reaches one or more aquifers.

Return flow. The amount of diversion water not consumed, but returned back to the stream; also called discharge.

Rotating Biological Contactor. An oxidation method (see oxidation process) whereby sewage-consuming organisms are grown on the artificial media of a rotating drum which is at all times half submerged in the wastewater.

Secondary treatment. Treatment level meeting effluent limitations for BOD and TSS of 30 mg/l (each) on a maximim monthly average basis. Secondary treatment removes virtually all floating and settleable solids and most BOD and TSS from the wastewater.

Septic wastewater. Wastewater in which material is undergoing decomposition under anaerobic conditions.

Settleable solids. The matter in wastewater which will not stay in suspension during a preselected settling period, such as one hour, but either settles to the bottom or floats to the top.

Sewage. A combination of liquid and water-carried wastes from residences, commercial buildings, industrial plants and/or institutions; wastewater.

Sewer system. Pipelines, conduits, pumping stations, force mains, or other structures, devices, appurtenances or facilities used for collecting or conducting wastes to an ultimate point for treatment or disposal.

Sewerage system. A system for disposing of wastes, either by surface or underground methods, and includes sewer systems, treatment works, disposal wells and other systems.

Significant Farmland. Land that has a suitable combination of physical and chemical characteristics for producing food, feed, forage, fiber and oil seed crops, and is also available for these uses. It has soil quality, growing season and moisture supply needed to economically produce sustained high yields of crops when treated and managed.

Sludge. A concentrate in the form of a semi-liquid mass deposited as a result of the treatment of sewage.

Stabilization. Treatment of sludge so that it can be disposed of without creation of undue nuisance conditions or environmental damage, measured by parameters such as odor, microbiological activity, toxicity, etc.

Sulfate. The sulfate ion is one of the major anions occurring in natural waters. Sulfate has a laxative effect upon humans when it is present in excessive amounts. For this reason, the U.S. Public Health Service Standards recommend an upper limit of 250 mg/l in waters intended for human consumption. Waters containing appreciable amounts of sulfate tend to cause odor and corrosion problems.

Thermal conditioning. A sludge treatment process in which the sludge is subjected to heat and pressure. The product is sterile and easily dewatered.

Threatened Species. Any species which is likely to become an endangered species within the foreseeable future throughout all or a signigicant portion of its range.

Thickening. A process which increases the solids content of sludge (up to 15%), still a liquid), and thus reduces the volume which must be handled.

Total dissolved solids (TDS). Theoretically, the anhydrous residues of the dissolved constituents in water. Actually, the term is defined by the method used in determination. In water and wastewater treatment, the Standards Methods tests are used.

Total organic carbon (TOC). A direct measure of carbon, which is the major constituent of organic matter. Unlike BOD and COD which are indirect measures of organic matter, TOC can be used successfully as an organic load parameter.

Total suspended solids (TSS). The sum of the solids which either float on the surface or are in suspension in water, wastewater, or other liquids, and which are largely removeable by laboratory filtering, usually stated in milligrams per liter.

Turbidity. Defined as capacity of material suspended in water to scatter light. Measured in arbitrary Jackson turbidity units (JTU) or, more recently, Formazin turbidity units (FTU). Highly turbid water is often called "muddy," although all manner of suspended particles contribute to turbidity.

208 Planning Area. Area designed for regional wastewater management planning, including point and non-point sources.

Wastewater. The spent water of a community. A combination of liquid and water-carried wastes from residences, commercial buildings, industrial plants and/or institutions; sewage.

Wetland. Area that is inundated by surface or ground water with a frequency sufficient to support vegetative or aquatic life that requires saturated soil conditions.

10.3 METRIC CONVERSIONS

To facilitate the public use of this report, English units are used throughout the EIS. These units may be converted to metric units by using the following conversion factors. For example, to convert a distance of 5 miles to kilometers multiply 5 by 1.6044; the result is 8.05 (or about 8) kilometers.

English Unit		Metric Equivalent and Abbreviation
	Length	
1 inch	=	0.02540 meters (m)
	=	2.540 centimeters (cm)
1 foot	=	0.30480 meters (m)
1 mile	=	1.6094 kilometers (km)
	Volume	
1 U.S. gallon	=	3.7853 liters (l)
	=	0.00379 cubic meters (m^3)
1 cubic foot	=	0.02832 cubic meters (m^3)
1 acre-foot	=	1233.5 cubic meters (m^3)
	Weight	
1 pound	=	0.4536 kilograms (kg)
	=	453.59 grams (g)
	Area	
1 acre	=	0.4047 hectares (h)
	=	0.004047 square kilometers (km^2)
1 square mile	=	2.5900 square kilometers (km^2)
	Volumetric Flow	
1 cubic foot per second	=	0.02832 cubic meters per second (m^3/sec)
1 millions gallons per day	=	3785.3 cubic meters per second (m^3/sec)

Temperature

Temperature in degrees Celsius (^oC) can be converted to temperature in degrees Farenheit (^oF) by the following formula:

$$(^oF) = 1.8\ (^oC) + 32$$

APPENDIX A
EXISTING WASTEWATER MANAGEMENT

APPENDIX A. EXISTING WASTEWATER MANAGEMENT

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TABLE A-1. DESCRIPTION OF EXISTING FACILITIES, LAS CRUCES.

Refer to the Facilities Plan, Molzen-Corbin, 1981, for additional details.

1. Collection System

An infiltration/inflow study was conducted in 1980 as part of the Facilities Plan. Infiltration of ground water to sewers is minimal (less than 3,000 gallons per day) because nearly all sewer lines are located above the ground-water table. It was determined that it would not be cost-effective to attempt to eliminate this amount of infiltration. Inflow following a heavy thunderstorm was determined to be 11.5 million gallons per day (mgd), originating principally from defective manholes or manhole covers opened to provide drainage. An ongoing City program to eliminate opening of manholes is projected to reduce inflow by eighty percent. Further efforts to reduce inflow were determined not to be cost-effective. Any new treatment facilities would need to be able to hydraulically accommodate average and maximum inflows of 0.77 mgd and 0.92 mgd of stormwater in addition to the projected sewage flow.

The collection system consists almost entirely of eight-inch vitrified clay pipe plus the interceptor system of larger pipes. Long distances and flat terrain in the valley necessitate six lift stations, shown on Figure 5-1. The collection lines are in good condition with the exception of four problem areas in the northeast caused by sand accumulation and/or inadequate slopes which result in odor problems (see "sewer problem areas", Figure 5-1). Resolution of these problems is felt to lie in normal maintenance plus some reconstruction, as discussed in section 5-2.

2. Interceptor System

The interceptor system consists of 48 lines, numbered in Figure 5-1 to correspond with evaluations in the Facilities Plan. The only existing problem noted was with Interceptor 103, which is inadequately sloped resulting in settling of sand and other solids resulting in odors.

The projected development of the area will concentrate population within the existing city limits. This growth will overload many of the existing interceptors by 2005, including several lines which are now flowing at capacity. Projected overloadings, with dates, are listed below and located on Figure 5-1. Table II-12 of the Facilities Plan lists reserve capacities in mgd for specific interceptor segments.

Year Interceptor Capacity Will Exceed Projected Flows	Interceptor Number
1980	103 (portion); 116; 131; 144 (portion)
1990	103 (portion); 140 (portion)
2000	103 (portion); 122 (portion); 123
2005	102 (portion); 103 (portion); 104 (portion); 118

The existing and projected per capita wastewater flow is estimated at 90 gallons per day.

3. Lift Stations

The sewer system includes six prefabricated lift stations. The Barker lift station is currently overloaded (see below and Figure 5-1).

Lift Station and Date Installed	Capacity (mgd)[1]	Maximum Flow 1980	Year Overloading Expected
University (1974)	3.39	2.75	2005
Barker (1976)	2.28	3.00	presently
Brown (1965)	0.36	0.09	none
Frenger Park (1965)	1.15	0.46	beyond 2005
Mesilla Park (1965)	0.58	0.32	beyond 2005
Town of Mesilla (1965)	0.18	0.17	beyond 2005

1. Capacity with one of three pumps out of service.

Other lift station problems are as follows.

University: air enters pump suction lines; insufficient stand-by generator capacity.

Barker: worn impeller in Pump No. 1; noisy odor control compressor; corroded wet well walls; air enters pump suction lines; insufficient stand-by generator capacity; odors.

Brown: wet well access tube corroded; insufficient stand-by generator capacity.

Frenger Park: station shell is rusting; no stand-by generator; occasional odor complaints.

Mesilla Park: floor is rusting; insufficient stand-by generator capacity.

Town of Mesilla: generally in poor condition; no stand-by generator.

TABLE A-1. (continued.)

4. Treatment Facilities

Additions, deletions and remodeling to the original trickling filter plant occured through 1975 when an attempt was made to convert to the conventional activated sludge process using the existing structures. An aerobic digester was also added in 1975. The present layout of the plant is shown in Figure A-1.

A National Pollutant Discharge Elimination System (NPDES) permit was issued under the Federal Clean Water Act to the City of Las Cruces for its discharge of treated domestic wastewater to the Rio Grande, a surface water; the permit became effective on March 6, 1976, and was scheduled to have expired on February 23, 1979. The City of Las Cruces made timely application for the renewal of its NPDES permit, so the existing permit will remain in effect until the new permit is reissued by EPA.

Effluent is chlorinated and discharged to the Rio Grande. The basic sludge disposal method is hauling to the City sanitary landfill, though a significant amount is picked up by private individuals at the plant for use as fertilizer/soil conditioner. Grit, scum and screenings are landfilled on the treatment plant grounds. No methane recovery occurs; energy is supplied by El Paso Electric.

Noise levels in and around the plant are moderate except in the vicinity of the aerators. Figure A-2 summarizes noise readings taken for this EIS.

Performance by treatment unit is given below as summarized from the Facilities Plan.

Screw Pumps: Consist of three parallel sets of two screws in series. Mechanically sound. Belts slip when wet, overloading gear box when they dry and catch. One pump generally out of service for repairs.

Entrance Works: as listed below

1. Bar Screen: Mechanically sound. Undersized for load resulting from all three pumps. Manually cleaned to wheelbarrow, resulting in odors. No back-up or by-pass.

2. Grit Chamber: Mechanically sound; undersized hydraulically. Configuration causes organics to settle, causing odors. Manual resuspension required periodically. Overflows to primary clarifiers.

3. Parshail Flume: Mechanically sound. Undersizing causes overflows. Poor positioning reduces accuracy of measurements.

4. Primary Clarifiers(2): Structurally sound; some maintenance needed. Piping to clarifiers improperly sized, reducing operational and removal efficiences.

Splitter Box: Structurally sound and hydraulically adequate but poor piping configuration makes it impossible to properly regulate flows to aeration basins.

Aeration Basins(2): Structurally and mechanically sound but of inadequate size and depth to allow efficient oxygen transfer. Compressors oversized, resulting in excessive energy consumption. Rate of return activated sludge inadequate. Maintenance time consuming and expensive.

Secondary Clarifiers(2): Structurally and mechanically sound. Scum removal and sludge draw-offs inadequate. Undersized for stand alone operation.

Chlorination System: Obsolete; unsafe relative to newer systems.

Sludge Pumps: Good condition; mechanically sound but sit in undersized sump, reducing their capacities. No standbys.

Aerobic Digestors(2): Structurally sound. Surface aerators inadequate for mixing and oxygen transfer. Maintenance is dangerous. Sludge settles if aerator turned off, and will not resuspend, preventing decanting and adding to drying demands.

Sludge Drying Beds: 1,980 square feet of old unlined beds, 4,320 square feet of new lined beds.

Laboratory: Undersized and outdated. No provision for industrial monitoring.

Office: Inadequate space for administration, spare parts, employee facilities.

Other: Anaerobic digesters(2) used prior to construction of aerobic digesters in 1975 are now used for storage of excess sludge prior to drying.

To summarize, most of the basic treatment equipment is structurally sound but overloaded or inefficient. Average flows exceed organic capacity by 1.7 mgd. Basic problems relate to inefficient aeration in both the aeration basins and the digesters, resulting in inadequate treatment, sludge handling problems and high energy consumption. These problems are compounded by piping which is poorly sized and placed and difficult to regulate. Seeds and pods from chili processing plants can be found in all treatment units and foam regularly occurs in aeration and clarifier basins. The foam often turns septic and overflows the basins, in spite of the use of defoaming agents (consisting of diesel oil base with flocculent); odors result.

TABLE A-1. (continued.)

5. Plant Influent and Effluent

A survey of industrial wastewater contributors was prepared as part of the Facilities Plan. The survey identified nine "industrial users" as defined by EPA and determined that all discharge organic-type wastes, most being food-processors. No "significant industrial users" (defined as contributing over ten percent of the flow or pollutant loading) were identified. The largest dischargers are two chili processors which contribute the bulk of the peak seasonal flow of 850,000 gallons per day. Chili processing wastes (e.g. seeds) can interfere with wastewater treatment and/or sludge disposal. The Facilities Plan's Industrial Pretreatment Survey recommends that Las Cruces develop a pretreatment program. Industrial dischargers are estimated to contribute the equivalent of five gallons per capita per day (gpcd) to the total flow of 90 gpcd. Average flow received by the plant is 4.6 mgd. Ranges of influent and effluent characteristics are listed below and compared to the current NPDES 30-day average permit requirements. Average values for 1979-80 are given in parentheses.

Parameter	Influent	Effluent	Permit
Suspended Solids (mg/l)	200-400 (230)	20-250 (85)	30
BOD_5 (mg/l)	175-300 (230)	30-150 (51)	30
COD (mg/l)	425-600 (500)	80-275 (140)	-
Dissolved Oxygen (mg/l)	0.1	2.0	-
pH (no units)	7.6-8.4 (8.0)	7.4-7.6 (7.5)	-
Fecal Coliform (no./100 ml.)	-	50-10,000 (320)	200

Additional water and sludge analyses done for the Facilities Plan in November of 1980 (NMSU, 1980) indicate that nitrogen levels, in mg/l, are 1.0 to 1.3 as nitrate, 12.3 to 16.0 as ammonia, and 26.6 to 40.6 as Kjeldahl (ammonia plus organic nitrogen, but not including nitrate and nitrite). Total solids were from 850 to 900 mg/l. Effluent data for other parameters, including salts and metals, showed no unusual levels and posed no real problems for potential agricultural uses.

TABLE A-2. ON-SITE SYSTEM REGULATIONS: SITE CONDITIONS AND LOT SIZES.

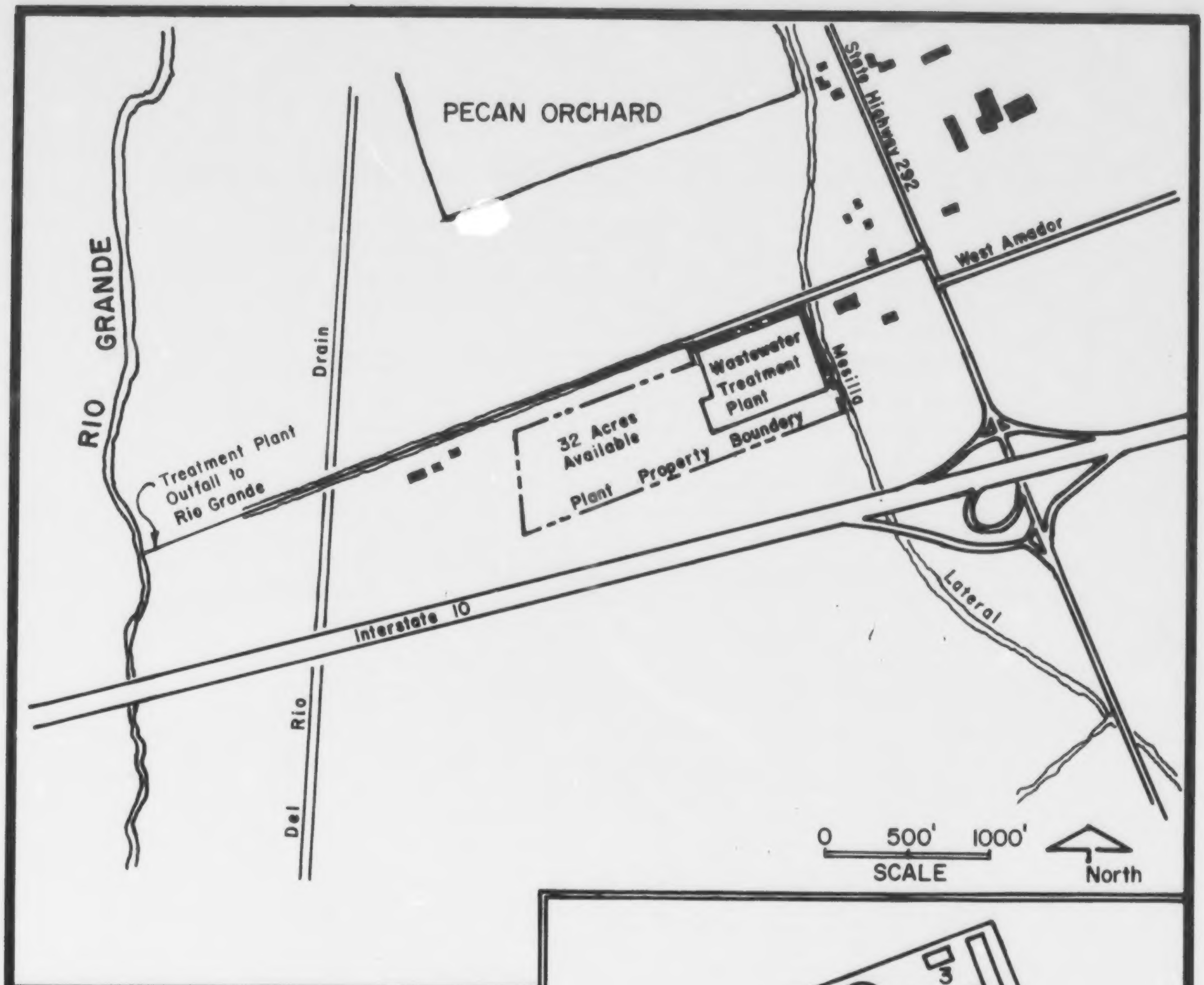
The minimum lot size required is determined by the most limiting condition under which a soil characteristic falls. For example, if for a certain soil all site limitations were slight to moderate, except that the slope was over 25%, then either an alternative absorption field would be required or a holding tank or recycle system would be necessary. Where black water is confined to an enclosed system (composter, holding tank), required depth to ground water can be reduced by two feet and absorption field size can be reduced by forty percent.

SOIL LIMITATIONS	Slight	Moderate		Severe
Percolation rate (minutes/inch)	0 - 15	16 - 30	30 - 60	More than 60
Slope (feet/100 feet)	0 - 8	8 - 25	8 - 25	More than 25
Flooding potential (overflow frequency in years)	Less than 1 in 25			More than 1 in 25
Soil depth (depth of suitable soil below trench bottom in feet)	More than 4			Less than 4
Depth to seasonal water table in feet, from bottom of excavation (lot sizes less than 2.5 acres)	More than 10' (or 6' if documented)			Less than 10' (or 6' if documented)
Depth to seasonal water table in feet, from bottom of excavation (lot sizes over 2.5 acres)	More than 4'			Less than 4'

DESIGN FLOW (GPD)	Minimum Lot Size (Acres)			
Community water and on-site sewerage				
0 - 375	0.33	0.40	0.50	No conventional absorption field allowed (see below)
376 - 1000	0.50	0.75	1.00	
1000 - 1500	1.00	1.20	1.50	
1500 - 2000	1.25	1.50	2.00	
On-site water and on-site sewerage				
0 - 1000	0.75	1.00	1.25	No conventional absorption field allowed (see below)
1000 - 1500	1.25	1.60	2.50	
1500 - 2000	1.70	2.25	3.25	

LIMITING CHARACTERISTIC	Alternative Absorption Field Methods
Soil Depth --	Mounds or sand filters to maintain a suitable soil depth below trench or excavation bottom of at least four (4) feet.
Percolation Rate -- (between 60 - 120 min/in)	Alternating fields, seepage pits, deep trenches or beds. Pits or trenches can be used to get below a slow percolating soil. All systems shall prevent surface ponding.
Slope -- (between 25 - 50%)	Deep trenches or terracing which will not allow any sidewall seepage.
Seasonal Ground-Water Table--	Mounds or sand filters which allow compliance with the requirements for seasonal ground water table.

Source: adapted from EIB (1979)


PECAN ORCHARD
State Highway 292
West Amador
RIO GRANDE
Drain
Wastewater Treatment Plant
Mesilla
32 Acres Available
Plant Property Boundery
Treatment Plant Outfall to Rio Grande
Lateral
Interstate 10
Del Rio
0 500' 1000'
SCALE
North
SLUDGE DRYING BEDS
1
2
3
4
5
6
7
8
9
10
11
North
0 100' 200'
SCALE

WASTEWATER TREATMENT PLANT LAYOUT

1. SCREW PUMP LIFT STATION
2. ENTRANCE WORKS
3. OFFICE AND LAB
4. SLUDGE PUMP HOUSES
5. PRIMARY CLARIFIERS
6. SPLITTER BOX
7. AERATION BASINS
8. SECONDARY CLARIFIERS
9. CHLORINATION FACILITY
10. AEROBIC DIGESTERS
11. SLUDGE STORAGE TANKS

FIGURE A-1.

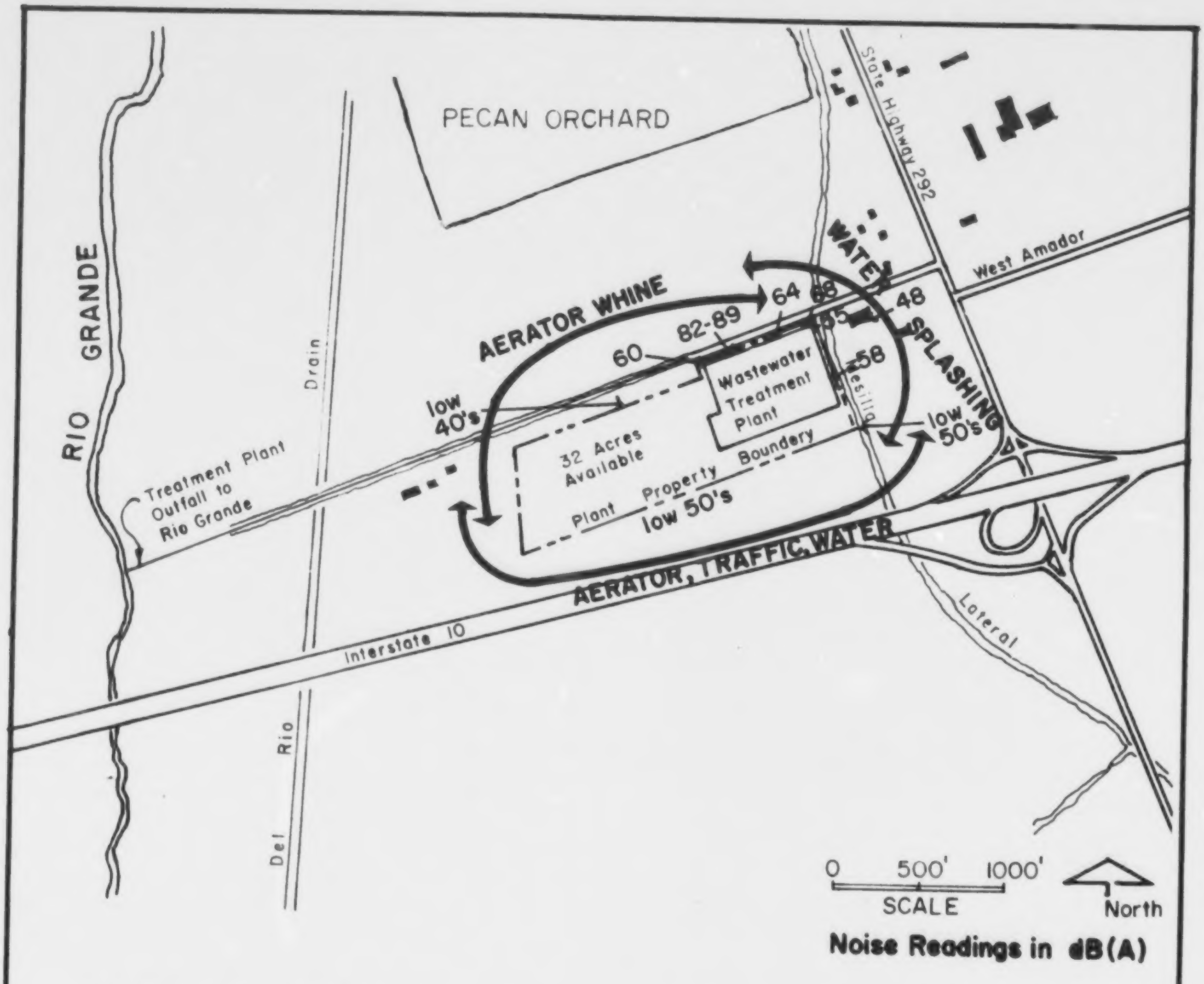

PECAN ORCHARD
State Highway 292
West Amador
RIO GRANDE
Drain
Del Rio
Treatment Plant Outfall to Rio Grande
AERATOR WHINE
WATER SPLASHING
AERATOR, TRAFFIC, WATER
64
68
48
82-89
65
60
58
low 40's
low 50's
low 50's
Wastewater Treatment Plant
32 Acres Available
Plant Property Boundery
Mesilla
Lateral
Interstate 10
0 500' 1000'
SCALE
North
Noise Readings in dB(A)

FIGURE A-2. LOCATIONS of NOISE READINGS

APPENDIX B

INFORMATION RELATED TO SELECTION OF ALTERNATIVES

APPENDIX B. INFORMATION RELATED TO SELECTION OF ALTERNATIVES

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INTRODUCTION

This Appendix contains detailed cost information on the applicant's preferred atlernative, following the brief description of the system given below.

The collection system would include all existing collection lines, the six existing lift stations, and the existing interceptor system. The existing system would be extended to the fringe areas of the already developed and serviced areas, primarily to the north and east of Las Cruces. New interceptors will be required to relieve presently and soon to be overloaded interceptors and to provide for extension of service into presently urbanizing areas. Table B-1 lists proposed interceptors, design flows and year required. Figure 5-3 in Chapter 5 locates the the proposed interceptors.

The wastewater treatment facilities will consist of a single 8.9 mgd plant at and adjacent to the existing treatment plant. The treatment plant would utilize roughing trickling filters with artificial media followed by a shortened activated sludge process. The treatment facilities are shown in schematic form on Figure B-1.

Sludge would be anaerobically digested and then hauled wet to a site west of the planning area near the Las Cruces municipal airport where it would be plowed into the ground. The existing limited sludge drying beds would be utilized for sludge disposal during inclement weather and as back-up for the sludge hauling and spreading equipment. A schematic of the sludge handling system is provided in Figure B-2.

Capital costs for all facilities are provided in Table B-2. Operation and maintenance costs are provided in Table B-3. Table B-4 lists required steps and dates in the process of getting the plant constructed.

TABLE B-1. PROPOSED INTERCEPTORS AND INTERCEPTOR IMPROVEMENTS

Interceptor No.	Description	Design Flow, mgd		Year Project Required
		Average	Maximum	
140	Siphon Replacement	1.20	3.00	1995
144	Siphon Replacement	0.12	0.38	1980
200	New Interceptor			
	6,100 feet of 42-inch pipe	5.06	11.50	1980
	7,520 feet of 42-inch pipe	4.88	11.00	
	7,720 feet of 36-inch pipe	4.33	9.86	
	6,740 feet of 33-inch pipe	2.83	6.66	
	103 manholes			
201	New Interceptor			
	4,130 feet of 15-inch pipe	1.31	3.25	2000
	3,460 feet of 12-inch pipe	1.10	2.84	
	21 manholes			
202	New Interceptor			
	2,060 feet of 15-inch pipe	1.45	3.66	1980
	7 manholes			
203	New Interceptor			
	620 feet of 8-inch pipe	0.14	0.44	1980
	3 manholes			
210	New Interceptor			
	3,580 feet of 15-inch pipe	1.36	3.38	1980
	8,760 feet of 12-inch pipe	1.02	2.65	1990
	46 manholes			
220	New Interceptor			
	1,590 feet of 12-inch pipe	0.72	2.00	1985
	1,480 feet of 10-inch pipe	0.72	2.00	
	11 manholes			
230	New Interceptor			
	700 feet of 18-inch pipe	0.85	2.26	1980
	5,900 feet of 15-inch pipe	0.85	2.26	
	8,300 feet of 10-inch pipe	0.54	1.48	
	41 manholes			
231	New Interceptor			
	1,420 feet of 12-inch pipe	0.31	0.90	1980
	4 manholes			
232	New Interceptor			
	1,300 feet of 8-inch pipe	0.18	0.55	1985
	4 manholes			
240	New Interceptor			
	850 feet of 18-inch pipe	12.0	24.5	1980
	1 manhole			
250	New Interceptor			
	150 feet of 15-inch pipe	0.59	1.61	1985
	2 manholes			
260	New Interceptor*	--	--	2005
261	New Interceptor*	--	--	2005
262	New Interceptor*	--	--	2005
270	New Interceptor*	--	--	2005

---

*New interceptors as shown on Figure III-2 needed at end of 20-year planning period. These lines are not sizes at this time. It is intended that these lines be designed using the most current projected population data available in year 2005.

TABLE B-2. CAPITAL COSTS.

Treatment Plant	
Influent Lift Station Modifications	$ 371,000
New Plant Influent Line	198,000
Entrance Works	466,000
Primary Clarifiers	751,000
Junction Box	12,000
Roughing Filter Lift Station	729,000
Roughing Filters	1,462,000
Junction Box	46,000
Aeration Basin	902,700
Secondary Clarifiers	884,300
Chlorination Chamber	401,700
Blower Building	522,300
Chlorination System	204,000
Emergency Power Provisions	120,000
Administration and Maintenance Buildings	639,000
Odor Control Provisions	125,000
Effluent Discharge Line	105,000
Site Work & Yard Piping	1,191,000
Dewatering During Construction	214,000
Demolition of Existing Plant Structures	108,000
Electrical	794,000
SUBTOTAL	$ 10,246,000
Engineering, Inspection, Legal & Administrative @10%	1,025,000
Contingencies @10%	1,025,000
TOTAL ESTIMATED CONSTRUCTION COST	$ 12,296,000
Sludge Management	
Gravity Thickener*	$ 482,000
Sludge Pumping* (total)	201,000
Anaerobic Digestion*	3,428,000
Yard Piping	350,000
Land Application**	1,081,000
SUBTOTAL	$ 5,542,000
Engineering, Inspection, Legal, & Administration @10%	554,000
Contingencies @ 10%	554,000
TOTAL ESTIMATED CONSTRUCTION COST	$ 6,650,000
Interceptors, Lift Stations, Collection Line Renovations	
Interceptors (1980 and 1985 costs only)	$ 7,603,000
Lift Stations	1,163,000
Ineligible Costs (easements)	20,000
Collection Line Renovations	4,800
TOTAL ESTIMATED CONSTRUCTION COSTS	$ 8,790,800
Summary	
Treatment Facilities, including Sludge Management	$ 18,946,000
Interceptors, Lift Stations, Collection System Renovations	8,790,800
Inflation @15%	4,158,200
TOTAL	$ 31,895,000

* Includes electrical costs

** Includes present worth of future equipment purchases

Source: Molzen-Corbin, 1981a.

TABLE B-3. ANNUAL OPERATION AND MAINTENANCE COST ESTIMATES.

TREATMENT PLANT

Unit Operation/Process	Energy Use (1000 kw-hr/yr)	Labor (mh/yr)	Materials ($/yr)	Energy[a]/ Costs ($/yr)	Labor[b]/ Costs ($/yr)	Total
Influent Pumping	659	1,120	$ 8,000	$ 39,540	$ 11,200	$ 58,740
Preliminary Treatment	59	2,680	5,500	3,540	26,800	35,840
Primary Clarifiers	10	1,970	4,500	600	19,700	24,800
Intermediate Pumping	712	1,120	8,000	42,720	11,200	61,920
Roughing Filters	--	260	2,000	--	2,600	4,600
Aeration Basin	1,215	3,500	7,000	72,900	35,000	114,900
Secondary Clarifiers	10	2,180	5,000	600	21,800	27,400
Return Activated Sludge Pumping	170	450	1,000	10,200	4,500	15,700
Chlorination	261	1,125	36,000	15,660	11,250	62,910
Yardwork	--	1,800	4,500	--	18,000	22,500
Monitoring	--	3,945	500	--	39,450	39,950
Administration & General	--	2,400	8,500	--	24,000	32,500
Totals	3,096	22,550	$ 90,500	$ 185,760	$ 225,500	$ 501,760

SLUDGE MANAGEMENT

Operation/Process	Energy Use (1000 kw-hr/yr)	Gal. of fuel/yr	Labor (mh/yr)	Materials ($/yr)	Energy[d]/ Costs ($/yr)	Labor[e]/ Costs ($/yr)	Total
Gravity Thickening	20	--	700	$ 3,000	$ 1,200	$ 7,000	$ 11,200
Sludge Pumping	123	--	1,280	3,300	7,380	12,800	23,480
Anaerobic Digestion	c/	--	4,160	10,000	--	41,600	51,600
Land Application	--	33,300	10,400	$ 28,200[f]/	$ 49,950	$ 100,400	$ 178,550
Unit Totals	143	33,330	16,540	44,500	58,530	161,800	$ 264,830

a. Based on $0.06 per kilowatt-hour
b. Based on average of $10.00 per manhour
c. Electrical requirements are offset by digester gas fueled engine generator
d. Electrical cots based on $ 0.06 per kilowatt-hour; fuel costs based on $ 1.50 per gallon
e. Based on $ 10.00 per manhour
f. Includes truck maintenance costs

Source: Molzen-Corbin, 1981a.

TABLE B-4. ANTICIPATED PROJECT SCHEDULE.

This is an optimistic schedule and assumes the necessary funds will be available to undertake the work as outlined.

Final Facilities Plan and Environmental Impact Statement Hearing	January 1981
Plan submitted to NMEID	---
Development of pretreatment program initiated	January 1982
Plan approved by NMEID and forwarded to EPA	March 1982
Plan and EIS approved by EPA	June 1982
Step 2 application submitted with draft engineering agreement	June 1982
Water conservation program development initiated	September 1982
Step 2 grant awarded	September 1982
Engineering agreement approved by City - design started	October 1982
Pretreatment program submitted to NMEID and EPA	November 1982
Bonding arrangements for local funds initiated	November 1982
Draft plan of operation prepared	August 1983
Plans and specifications submitted to City	October 1983
Plans and specifications submitted to NMEID	November 1983
Local funding arrangements finalized	November 1983
Step 3 application submitted with draft agreements	December 1983
Plans and specifications approved by NMEID and forwarded to EPA and Corps	February 1984
Plans and specifications approved by EPA and Corps	May 1984
Step 3 grant awarded	July 1984
Agreement approved by City	August 1984
Agency authorization to advertise for bids	September 1984
Advertisement placed	October 1984
Bids opened	December 1984
Contract awarded with agency approval	February 1985
Construction begins	April 1985
O&M Manual preparation initiated	July 1985
Plan of operation completed and submitted	August 1985
Draft O&M Maual submitted	May 1986
Sewer rate study completed and submitted	August 1986
New sewer rates adopted	April 1987
Final O&M Manual submitted	April 1987
Start-up training initiated	June 1987
Construction completed and plant put into operation	October 1987

Source: Molzen-Corbin, 1981a.

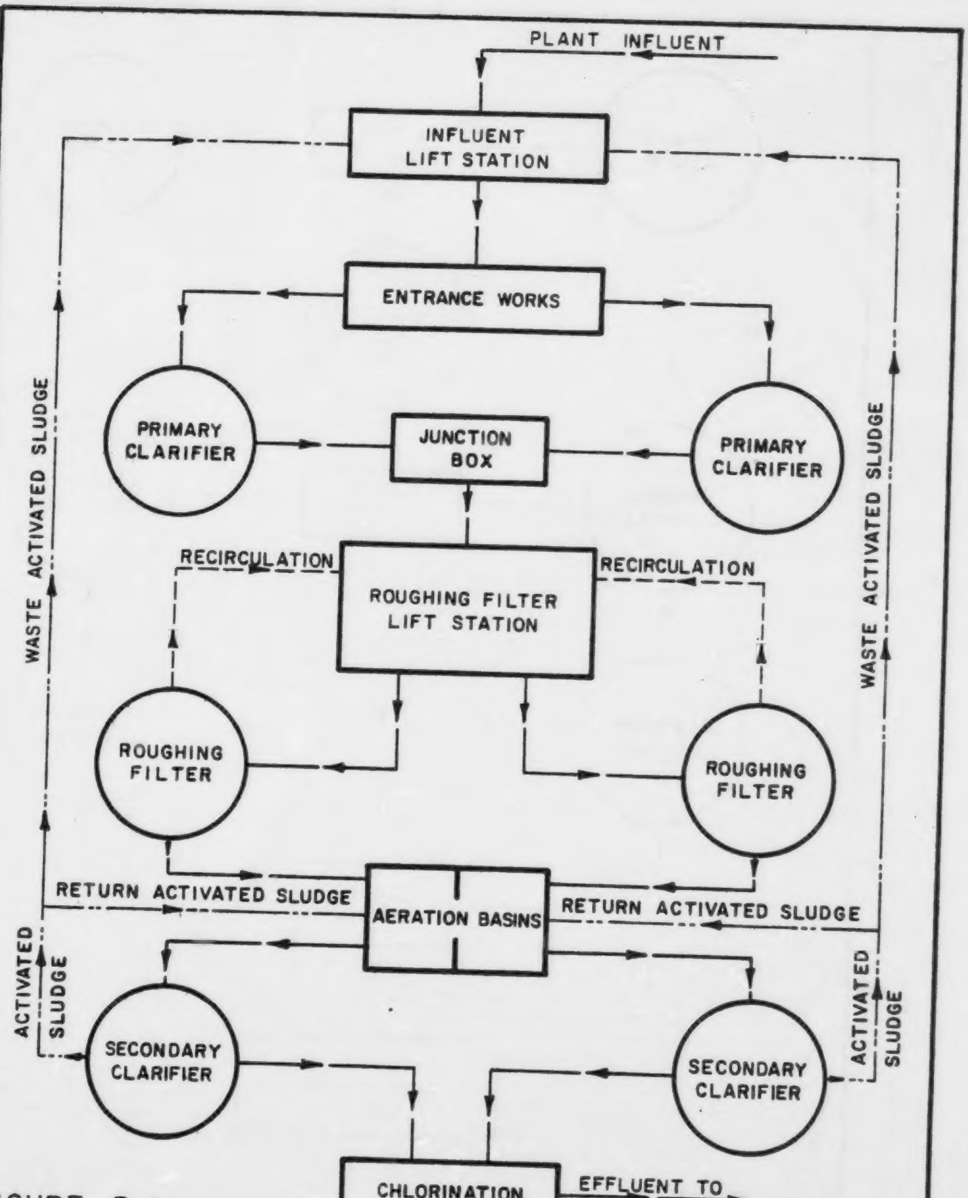
PLANT INFLUENT
INFLUENT LIFT STATION
ENTRANCE WORKS
PRIMARY CLARIFIER
JUNCTION BOX
PRIMARY CLARIFIER
WASTE ACTIVATED SLUDGE
WASTE ACTIVATED SLUDGE
RECIRCULATION
ROUGHING FILTER LIFT STATION
RECIRCULATION
ROUGHING FILTER
ROUGHING FILTER
RETURN ACTIVATED SLUDGE
AERATION BASINS
RETURN ACTIVATED SLUDGE
ACTIVATED SLUDGE
SECONDARY CLARIFIER
SECONDARY CLARIFIER
ACTIVATED SLUDGE
CHLORINATION
EFFLUENT TO RIO GRANDE

FIGURE B-1.

FLOW SCHEMATIC-ROUGHING FILTER/ACTIVATED SLUDGE ALTERNATIVE

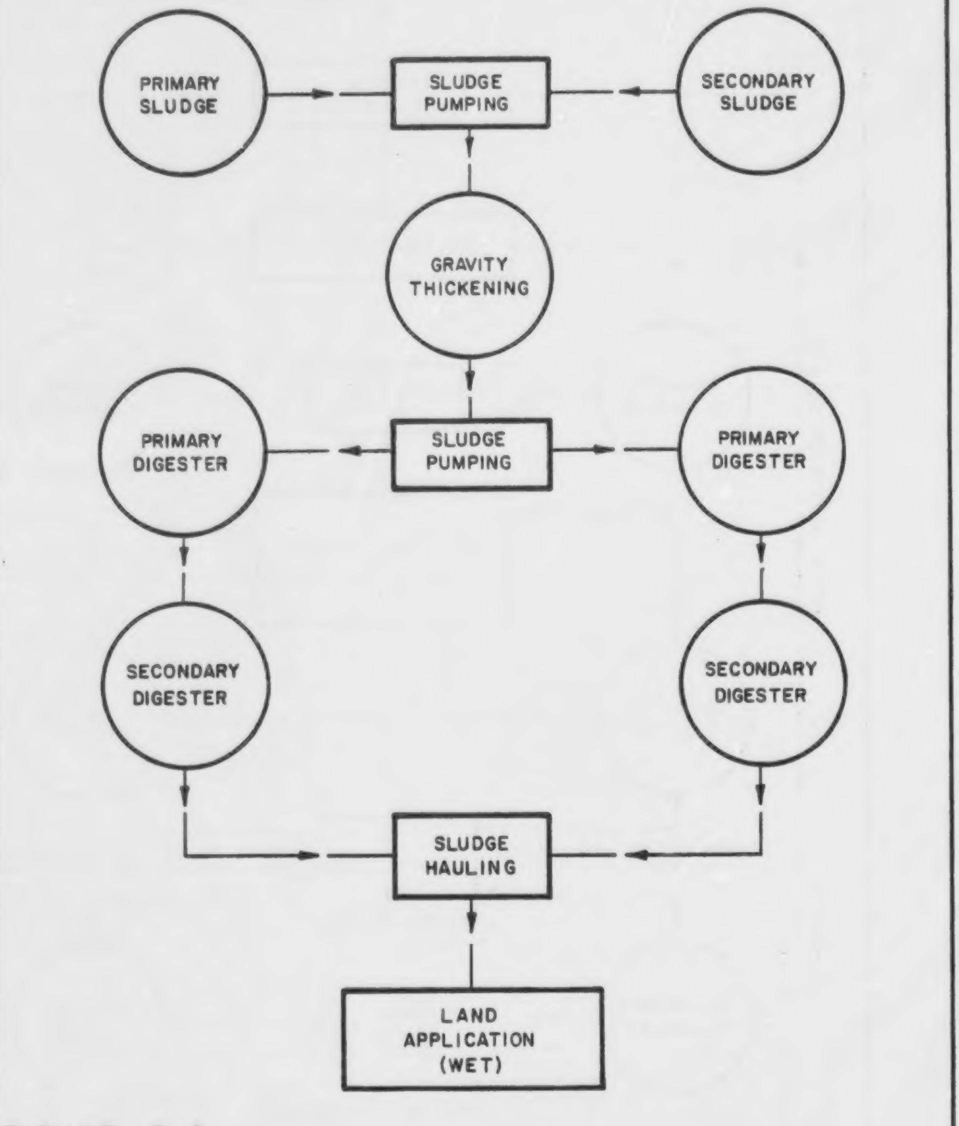
PRIMARY SLUDGE
SLUDGE PUMPING
SECONDARY SLUDGE
GRAVITY THICKENING
PRIMARY DIGESTER
SLUDGE PUMPING
PRIMARY DIGESTER
SECONDARY DIGESTER
SECONDARY DIGESTER
SLUDGE HAULING
LAND APPLICATION (WET)

FIGURE B-2.
FLOW SCHEMATIC
ANAEROBIC DIGESTION / WET SLUDGE LAND APPLICATION ALTERNATIVE

APPENDIX C
COORDINATION

APPENDIX C. COORDINATION

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---

a. At the commencement of this EIS preparation, EPA wrote to other State and Federal agencies and requested their cooperation in writing this EIS. These letters are replies from those agencies.

b. Once a proposed action was selected, it was necessary to contact other agencies to see if the action would be in conformance with those agencies' policies and regulations (see Table 3-1).

OFFICE OF THE COMMISSIONER
UNITED STATES SECTION

INTERNATIONAL BOUNDARY AND WATER COMMISSION
UNITED STATES AND MEXICO
IBWC BUILDING
4110 RIO BRAVO
EL PASO, TEXAS 79902

SEP 2 1980

Mr. Clinton B. Spotts
Regional EIS Coordinator (6ASAF)
Environmental Protection Agency
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts:

Your August 20, 1980 letter advised that your agency has decided that an Environmental Impact Statement will be required for the design and construction of wastewater treatment facilities at Las Cruces, New Mexico, and you request we participate as a cooperating agency in the preparation of your EIS.

Our agency constructed some 40 years ago and maintains the Rio Grande Canalization Project in the area of your study. A copy of a technical description of the Project is enclosed for your convenient reference. Any alternatives considered in your study which involve new structures through our levee should be discussed with and reviewed by our staff.

As it appears our involvement in your project will be quite minimal. However, if you have questions pertaining to the international aspects of Rio Grande, we will be pleased to respond to them.

We appreciate the invitation to participate and would like to be kept informed of the progress of your study.

Sincerely,

George R. Baumli
George R. Baumli
Principal Engineer
Investigations & Planning Division

Enclosure:
As stated

NEW MEXICO DEPARTMENT OF AGRICULTURE

OFFICE OF THE DIRECTOR
Box 3189/Las Cruces, New Mexico 88003
Telephone (505) 646-3007

NEW MEXICO STATE UNIVERSITY

September 8, 1980

Mr. Clinton B. Spotts
Regional EIS Coordinator
USEPA, Region 6
1201 Elm St.
Dallas, Texas 75270

Dear Mr. Spotts:

This is in response to your letter of August 19, requesting the New Mexico Department of Agriculture's participation in reviewing and commenting on the Environmental Impact Statement prepared by the City of Las Cruces.

The issues to date are:

1. Impacts on environmentally significant agricultural land.

2. Changes in land use concentrations or distributions.

3. Impacts of induced development on ambient air quality.

4. Impact on groundwater.

5. Odors.

This department would be pleased to cooperate with your agency on this matter.

Sincerely,

W. P. Stephens
William P. Stephens
Director

WPS:wpc

HEALTH
ENVIRONMENT department

CONSTRUCTION GRANTS ADMINISTRATION
STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT DIVISION
P.O. Box 968, Santa Fe, New Mexico 87503
(505) 827-5271
Thomas E. Baca, M.P.H., Director

Bruce King
GOVERNOR

George S. Goldstein, Ph.D.
SECRETARY

Larry J. Gordon, M.S., M.P.H.
DEPUTY SECRETARY

RECEIVED
SEP 22 1980
EPA
REGION VI
S & A DIV.

September 19, 1980

Mr. Clinton D. Spotts
Regional EIS Coordinator
U.S. EPA Region IV
First International Building
1201 Elm Street
Dallas, Texas 75270

Re: Las Cruces Environmental Impact Statement #C-35-1082-01

Dear Mr. Spotts:

In response to your letter of August 19, we have reviewed the pertinent regulations C40 CFR 1501.6 and 40 CFR 1508.5 in regard to the involvement of the New Mexico Environmental Improvement Division becoming a cooperating agency in the development of the Environmental Impact Statement for the Las Cruces wastewater project.

Unfortunately, previous program committments preclude our involvement in the actual preparation of the environmental impact statement. However, we would like to continue to review and monitor the preparation of the Las Cruces Environmental Impact Statement and the Public Participation Work Plan.

If you have any questions regarding our role in this project, please contact me.

Sincerely,

Alice Grisham

Alice Grisham
Construction Grants Administrator

AG:mkt

cc: Ken Needham, City Engineer, Las Cruces
    Lee Wilson, Wilson & Associates
    Del Archuleta, Molzen-Corbin & Associates
    Roy McKeag, EID District III

EQUAL OPPORTUNITY EMPLOYER

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
NEW MEXICO STATE OFFICE
P.O. BOX 1449
SANTA FE, NEW MEXICO 87501

IN REPLY REFER TO
1792 (922)

SEP 15 1980

RECEIVED
SEP 18 1980
EPA
REGION VI
S & A DIV.

United States Environmental
Protection Agency
Clinton Spotts, Regional EIS
Coordinator
Region VI
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts:

In regard to your letter of August 19, 1980, we do not believe that BLM programs or lands are involved relating to the proposed wastewater treatment facility. Our office does not have any special expertise with regard to wastewater treatment. In addition, in fiscal year 1981, our Las Cruces District will be preparing the Southern Rio Grande Grazing EIS and beginning an inventory for the Las Cruces/Lordsburg planning area. These commitments preclude involvement in another EIS. Unfortunately we are not able to participate as a cooperating agency as per your suggestion.

The Las Cruces District does have existing data (planning documents) you may wish to review to assist in the preparation of your environmental documents.

Sincerely yours,

AssociateState Director
Acting

cc:
Las Cruces District

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

POST OFFICE BOX 1306
ALBUQUERQUE, NEW MEXICO 87103

IN REPLY REFER TO:

SE

July 29, 1980

Mr. Clinton B. Spotts
Regional EIS Coordinator
U.S. Environmental Protection Agency
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts:

This is in reply to your letter of July 22, 1980, which requested information about species which are listed or proposed to be listed as threatened or endangered as provided by the Endangered Species Act. Your area of interest is the Las Cruces Wastewater Treatment Facility, Dona Ana County, New Mexico.

The Fish and Wildlife Service provides upon request a list of those species, both proposed and listed, which may be affected by Federal construction activities.

Our data indicate no listed or proposed species would be affected by the proposed action in the area of interest. If I may be of further assistance, do not hesitate to call the Endangered Species Office (505-766-3972; FTS 474-3972).

Sincerely yours,

Jerry L. Stegman

Acting Regional Director

cc: Field Supervisor (ES), Albuquerque Field Office, Albuquerque, New Mexico
Area Manager (SE), Phoenix Area Office, Phoenix, Arizona

RECEIVED
EPA

STATE OF NEW MEXICO
DEPARTMENT OF
FINANCE AND ADMINISTRATION
STATE PLANNING DIVISION

505 DON GASPAR AVENUE
SANTA FE, NEW MEXICO 87503
(505) 827-2073
(505) 827-5191
(505) 827-2108

BRUCE KING
GOVERNOR

Kathleen R. Marr
SECRETARY

ANITA HISENBERG
DIRECTOR

JOE GUILLEN
DEPUTY DIRECTOR

November 5, 1980

Ms. Karen Lyncoln
Mimbres and Associates
200 W. DeVargas, Suite 7
Santa Fe, New Mexico 87501

RE: Environmental Impact
Statement, Las Cruces

Dear Ms. Lyncoln:

The Environmental Impact Statement for a Wastewater Treatment Facility in Las Cruces, New Mexico has been reviewed by this office.

The following properties are entered in or are eligible for nomination to the National Register of Historic Places, or are listed on the State Register. La Mesilla Historic District has been nominated to the National Register of Historic Places. The Mesquite and the Alameda-Depot Historic Districts are listed on the State Register and have been recommended to the National Register of Historic Places. Furthermore, the Nestor Armijo House is listed on the National Register of Historic Places, and the Amador Hotel is listed on the State Register.

Because of the high density of archaeological sites, in the immediate vicinity of the proposed project, this office will recommend that all proposed rights-of-way and that all affected lands be inspected by a qualified archaeologist to determine if any archaeological resources are present, and if so, to recommend measures necessary to mitigate the adverse effects of the projects on those resources.

Should you have any questions regarding our comments on the above application, do not hesitate to contact this office.

Sincerely,

Thomas W. Merlan
State Historic Preservation Officer
Historic Preservation Bureau

TWM:NB:jmg

HEALTH & ENVIRONMENT department
STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT DIVISION
P.O. Box 968, Santa Fe, New Mexico 87503
(505) 827-5271
Thomas E. Baca, M.P.H., Director

Bruce King
GOVERNOR

George S. Goldstein, Ph.D.
SECRETARY

Larry J. Gordon, M.S., M.P.H.
DEPUTY SECRETARY

June 5, 1981

Stuart Gray
EPA, Region VI
First International Building
1201 Elm Street
Dallas, Texas 75270

RE: Landfill Disposal for Sludge in Las Cruces; C-35-1082-01

Enclosed is the landfill proposal for disposal of sludge for Las Cruces which Dr. Ralph Clark has prepared. This has been reviewed by our solid waste people and they have found it satisfactory to the State. New Mexico has not taken over of certification of landfills and therefore cannot certify to this proposal meeting R.C.R.A. requirements.

Would you please direct this request to the appropriate people in EPA for their approval.

If your have any questions, please do not hesitate to call.

Sincerely,

DAVID GALLEGOS, P.E.
Engineering Section

DG:vrt

Enclosure

xc: Ralph Clark, Molzen-Corbin

EQUAL OPPORTUNITY EMPLOYER

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1580
ALBUQUERQUE, NEW MEXICO 87103

REPLY TO ATTENTION OF

SWACO-OR

16 June 1981

Ralph H. Clark, P.E.
Molzen-Corbin and Associates
2301 Yale Blvd. S.E.
Albuquerque, New Mexico 87190

Dear Mr. Clark:

Reference is made to your letter dated 4 June 1981 in which you requested a determination regarding the need for a Section 404 Permit for your proposed construction of a new effluent line to the Rio Grande from the City of Las Cruces' proposed wastewater treatment facilities.

We have studied the project description, other records, and documents available to us. The proposed construction does not come under Section 404 jurisdiction and a Section 404 Permit will not be required. This determination was made because the proposed project will not involve the placement of fill below the ordinary highwater elevation of the Rio Grande.

Should you have any questions please do not hesitate to write or call Mr. James Wood or Mr. Wayne Lea at (505) 766-2776.

Sincerely,

RICHARD D. BLUM, P.E.
Chief, Construction-Operations Division

Reproduced from best available copy.

Bruce King
Governor

Kathleen R. Marr
Secretary

State of New Mexico
DEPARTMENT OF
FINANCE AND ADMINISTRATION
STATE PLANNING DIVISION

505 DON GASPAR AVENUE
SANTA FE, NEW MEXICO 87503
(505) 827-2073
(505) 827-5191
(505) 827-2108

Anita Hisenberg
Director

Joe Guillen
Deputy Director

September 30, 1981

Mr. David B. Hawkins
Lee Williams and Associates
P. O. Box 931
Santa Fe, New Mexico 87501

RE: Environmental Statement,
Wastewater Treatment Facility,
Las Cruces, New Mexico

Dear Mr. Hawkins:

We have received a copy of your letter, dated September 21, 1981, to Curtis Schaafsma, State Archaeologist, concerning the additional alternative to the above mentioned wastewater project.

This additional alternative consists of a provision for the injection of sludge on a 40 acre site west of Las Cruces. The site files of the Laboratory of Anthropology, Museum of New Mexico, have been checked and only one archaeological site (LA 6310) has been recorded for the area in Sections 26, 27, 28, 33 and 34, T23S, R1W, which is being considered for the sludge injection project. This archaeological site is a lithic scatter, possibly Archaic in date, or possibly a special activity site postdating the introduction of ceramics. There is a definite possibility of there being additional sites in this area. If this alternative is selected for development, the specific 40 acres involved should be inspected by a qualified professional archaeologist to determine if any archaeological sites are present and, if so, to recommend measures necessary to mitigate the adverse effects of the project on these sites if they are found to be eligible for the National Register of Historic Places.

We also wish to mention that the area which is being considered for the sludge injection, covering almost 4 sections or 2560 acres, overlaps a proposed land exchange between the Bureau of Land Management and the City of Las Cruces. The land which is proposed for transfer is part of the safety approach zone of the Crawford/Las Cruces Airport. The area of overlap is:

T23S, R1W, Section 27, S 1/2 SW 1/4 NW 1/4;
T23S, R1W, Section 27, N 1/2 NW 1/4 SW 1/4;
T23S, R1W, Section 28 - all except E 1/2 NE 1/4 NE 1/4
and SW 1/4.

We recently commented on the BLM's suggestion that the land transfer agreement contain a stipulation that this land would not be disturbed in any way by the City of Las Cruces, other than the construction of a perimeter fence, and that subsequent transfers of the land (out of the control of the City of Las Cruces) would also include this stipulation. Given this, we agreed that the land transfer would have no effect on the cultural resources within the transfer area, with the exception of the perimeter fence. If this transfer occurs, this land (see above) would not be available for a 40 acre sludge injection project, since this would involve disturbance of the land. The elimination of this area (ca. 580 acres), if the transfer occurs, would, of course, leave approximately 1980 acres to be considered for the sludge injection project.

Should you have any questions regarding our above comments, do not hesitate to contact this office.

Sincerely,

Thomas W. Merlan
State Historic Preservation Officer
Historic Preservation Bureau

TWM:CJLB:jmg

cc: Mr. Daniel C. B. Rathbun, Las Cruces District Director, BLM

Mr. Curtis Schaafsma, Laboratory of Anthropology, Museum of New Mexico

MOLZEN-CORBIN & Associates
CONSULTING ENGINEERS

Craddock Commerce Center
2301 Yale Blvd. S.E.
P.O. Box 3632
Albuquerque, NM 87190

(505) 242-5700

October 8, 1981

Mr. Ken Needham
Director of Utilities
City of Las Cruces
P. O. Drawer CLC
Las Cruces, New Mexico 88001

RE: Land For Sludge Disposal

Dear Mr. Needham:

Attached is a map received from the Las Cruces BLM office (Madeline L. Dzielak) which indicates the land being requested by FAA/City for expansion of the airport clear zones. Unfortunately, with the law under which these would be transferred, this land could not be used for the proposed sludge disposal. Also, we understand the remainder of section 27 is part of the land being considered for an industrial park and won't be available.

It is suggested the City obtain the land necessary for sludge disposal now while it is still available. This would assure availability when the new treatment facilities are constructed but also for any interim solutions, digester cleaning, etc. The suggested area is within T23S, R1W as follows:

W1/2 of the SW1/4 of Section 28	80 acres±
That portion of the NW1/4 of the NW1/4 of Section 33 that is north of the I-10 north frontage road north right-of-way	24 acres±
	104 acres±

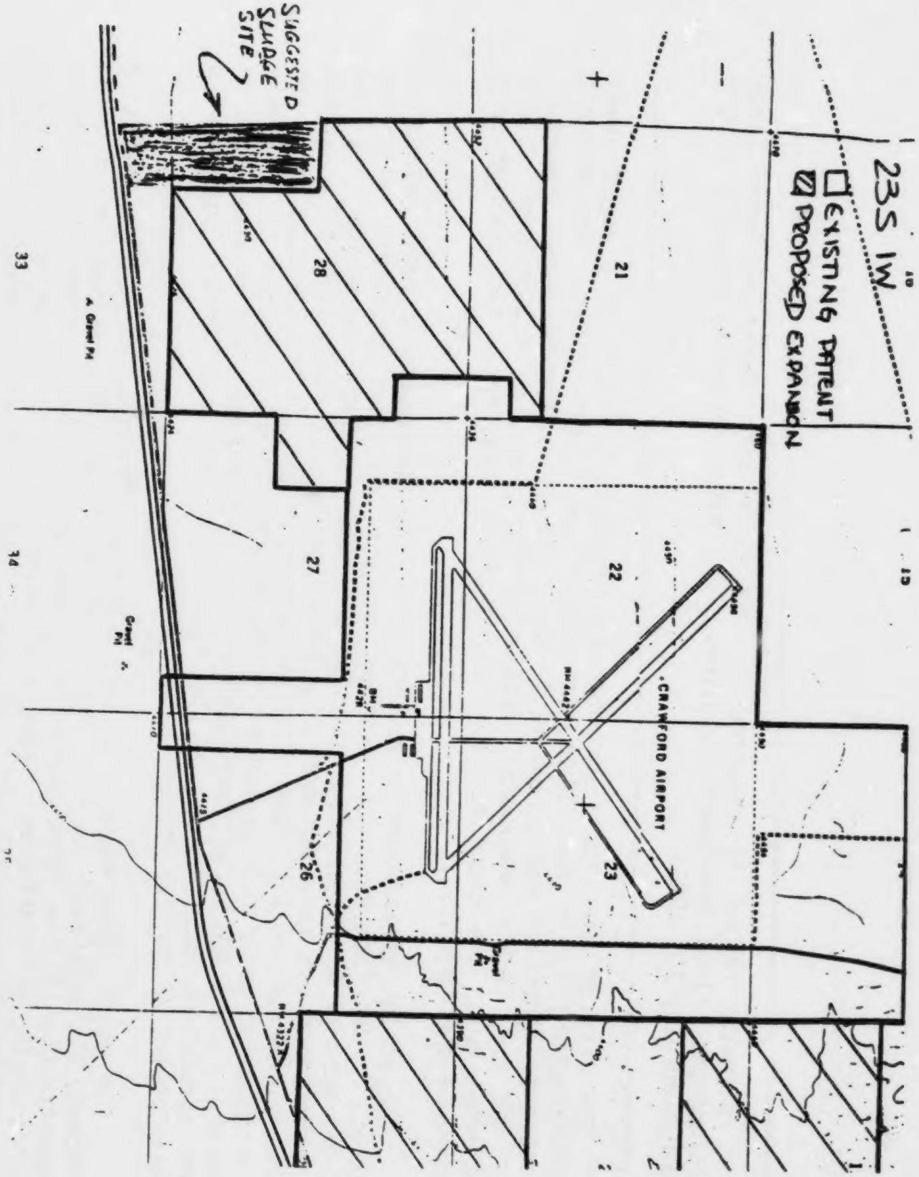
This should provide more than enough land and would have easy access off the frontage road. Although we have looked at the area, you may want to see it yourself before processing the paper work. It has been our experience that BLM property for community use can generally be obtained within six months. If there is any way we can help you, please call me.

Very truly yours,

MOLZEN-CORBIN & ASSOCIATES

Ralph H. Clark, P.E.

cc: Craig Andrews, Las Cruces
Lee Wilson & Associates

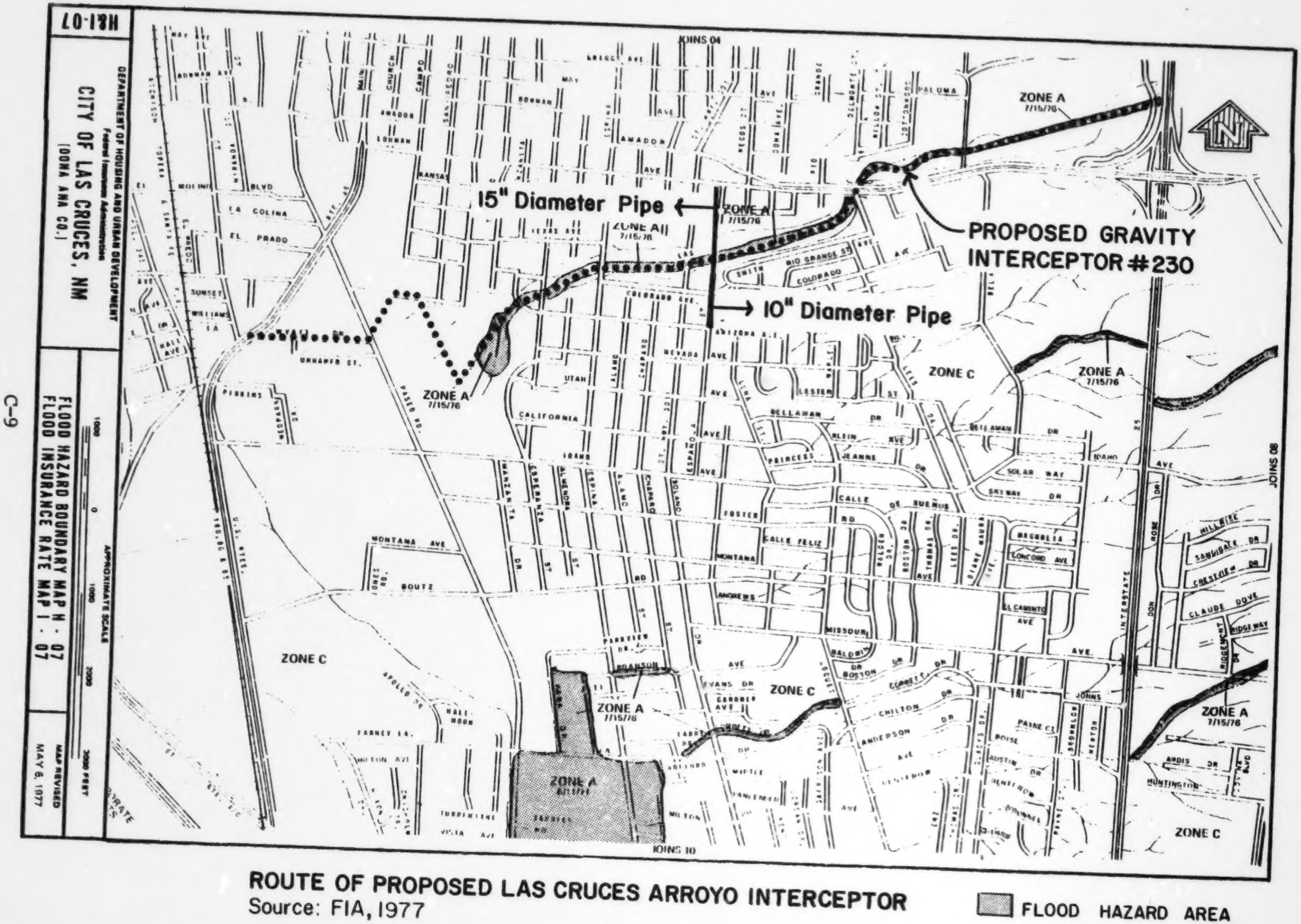


The following notice is prepared in compliance with Executive Order 11988 (reference: Flood Management Guidlines, U.S. Water Resources Council, 43 CFR 6030, February 10, 1978).

The City of Las Cruces proposes to construct portions of a major sewer (Interceptor 230) in the floodplain area of Las Cruces Arroyo. The proposed action is described and evaluated in the Draft Environmental Impact Statement of the Las Cruces Wastewater Facilities Plan, and is illustrated on the attached map. The exact route of the proposed interceptor has not yet been surveyed and finalized.

The action is proposed to be located in the floodplain because: a) such a location is necessary to readily achieve required gradients for the interceptor; b) alternative locations would be more expensive; c) the construction can be undertaken in a manner which will avoid harm to or within the floodplain and will have no major adverse effect on the floodplain; d) the construction of the interceptor in the floodplain will conform to appicable federal, state and local floodplain protection standards; and e) there will be no structures constructed in the floodplain, and the action involves no development of the floodplain.

The major alternatives to the proposed alignment are to use existing street rights-of-way in the area. While these alternatives would avoid construction in the flood hazard area, they would require extensive excavation of streets, with attendent impacts of noise, traffic and business disruption and possible interruption of utilities. These alternatives would also result in a major increase in project costs due to the removal and replacement of street surfacing, and the greater excavation needed to obtain the necessary wastewater flow gradients.


PROPOSED GRAVITY INTERCEPTOR #230
15" Diameter Pipe
10" Diameter Pipe
ZONE A 7/15/76
ZONE C
JOINS 04
JOINS 08
JOINS 10
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
CITY OF LAS CRUCES, NM
(DONA ANA CO.)
APPROXIMATE SCALE
1000 0 1000 2000 3000 FEET
FLOOD HAZARD BOUNDARY MAP H - 07
FLOOD INSURANCE RATE MAP I - 07
MAP REVISED
MAY 6, 1977
H&I-07

ROUTE OF PROPOSED LAS CRUCES ARROYO INTERCEPTOR
Source: FIA, 1977

▨ FLOOD HAZARD AREA

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